CONTRACT NAS5-32605
EOSDIS IV&V

INTEGRATED SUPPORT ENVIRONMENT (ISE) ELEMENT USERS GUIDE

(DRAFT - Deliverable 0411)

November 30, 1995

Prepared by:

INTERMETRICS
WVU/NASA Software IV&V Facility
100 University Drive
Fairmont, WV 26554

Prepared for:

NASA Goddard Space Flight Center
EOSDIS Project, Code 505
Greenbelt, MD 20770

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PREPARED BY:

_____
Tim Davis
Technical Lead

PREPARED BY:

_____
Llew Williams
Task Member

REVIEWED BY:

_____
Randy Hefner
Task Leader

RECEIVED BY:

_____
Lee LaCoste
Document Log Manager

APPROVED BY:

_____
Frank Rockwell
Program Manager

INTERMETRICS
WVU/NASA Software IV&V Facility
100 University Drive
Fairmont, WV 26554

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1. INTRODUCTION

1.1 Identification of Document

This is the Element Users Guide Document for the Integrated Support Environment (ISE). The ISE is being established under the IV&V Infrastructure and Tools task (Task 4B) and will provide the tools and infrastructure necessary for the performance of the Earth Observing System Data and Information System (EOSDIS) Independent Verification and Validation (IV&V) contract.

1.2 Purpose and Scope of Document

The ISE is primarily comprised of Commercial Off-The-Shelf (COTS) products. However, the establishment of the ISE also includes developed tools and customizations of off-the-shelf Lotus Notes database applications. This document identifies the users guide information associated with tools which are being developed for incorporation into the ISE. The user interface information captured within this document provides the information necessary to understand the purpose and functionality provided by each tool interface. This document is intended to serve as an aid to tool users.

Note that no users guide information is included within this document for the World Wide Web (WWW) based homepage applications. The EOSDIS IV&V, EOSDIS Ground System (EGS) Integration and Test, and the IADB homepages are extremely intuitive and only require familiarity with one of the many WWW browsers (i.e. Netscape, Mosaic, etc.).

1.3 Document Status and Schedule

This is the initial DRAFT of the ISE Element Users Guide Document. The first official revision of the document is scheduled for delivery on May 31, 1996. This DRAFT release of the user guide document includes preliminary information for the following ISE development items:

1. Automated Requirements Database (ARDB)
2. Issue/Discrepancy Handling System (IDHS)
3. Interface Analysis Database (IADB)
4. Test Management Database (TMDB)
5. RTM-to-ISE Utility

Following the release of the first official ISE Element Users Guide document revision in May 31, 1996, this document will be updated as necessary to accurately reflect the user interfaces for developed tools within the ISE. The initial release of the ISE will be fielded in February 1996 and will evolve as additional IV&V needs are defined during the span of the ten year project.

1.4 Documentation Overview and Organization

This document presents users guide information which is being maintained for ISE development items. At a minimum, the users guide information maintained includes the anticipated Graphical User Interface (GUI) hierarchy for each tool and a description of each tool interface screen. In addition to the users guide information, this document contains an overview of the design approach, some general information on the types of applications being developed, and a brief description of the development tools and environment.

Since this document only addresses those elements of the ISE which are associated with new development, a complete understanding of the ISE can not be garnered from the review of this document. Refer to the ISE System Requirements Document or the ISE System Architecture Document to obtain a more complete understanding of the functionality to be exhibited by the ISE infrastructure.

Section 1 establishes the context of the document through an `introduction`. This identifies the document, the scope and purpose of the document, and the status of the document.

Section 2 lists the `related documentation` including parent documents and applicable documents.

Section 3 describes the `design approach and tradeoffs`. This section provides an overview of development initiatives, development tools, and the rapid prototyping approach that is being followed.

Section 4 details the `users guide information` associated with ISE development items.

Section 5 contains a list of `abbreviations and acronyms` used in this document.

Section 6 contains a `glossary` of terms used in this document.

Section 7 contains `notes` pertaining to material in this document.

Section 8 identifies the `appendices` included in this document.

2. RELATED DOCUMENTATION

2.1 Parent Documents

The following documents are parents to this document:

1. "Earth Observing System (EOS) Performance Assurance Requirements (PAR) for the Independent Verification and Validation (IV&V) of the EOS Data and Information System (EOSDIS)", GSFC 420-05-05, dated March 23, 1993.
2. "Statement of Work for the Independent Verification and Validation (IV&V) of the EOS Data and Information System and Key EOS Ground System Interfaces", dated April 19, 1993.
3. "EOSDIS IV&V Task 4 IV&V Infrastructure and Tool Development Task Statement of Work", dated 19 October 1994.
4. "EOSDIS IV&V Task 4B IV&V Infrastructure and Tool Development Task Statement of Work", dated 19 June 1995.

2.2 Applicable Documents

The following documents are referenced herein and are directly applicable to this volume:

1. ISE System Requirements Document (Deliverable 0404) dated 28 October 1994.
2. ISE System Architecture Document (Deliverable 0405) dated 30 January 1995.
3. ISE Element Requirements Document (Deliverable 0408) dated 14 April 1995.
4. ISE Element Software Design (Deliverable 0409) dated 14 July 1995.
5. "NASA Software Documentation Standard Software Engineering Program" NASA-STD-2100-91, dated July 29, 1991

3. DESIGN APPROACH AND TRADEOFFS

3.1 Rapid Prototyping Approach

In the rapid prototyping approach, the most important and critical software requirements are defined to the extent that current knowledge and experience permits for the incremental capabilities required. After a core set of requirements are documented for an incremental capability, a "quick" object oriented design addressing the current set of requirements is prepared, and a rapid prototype is developed and tested. The purpose of the prototype is to gain information about the requirements and confidence in the correctness of the prototype design. Design characteristics such as efficiency, maintainability, capacity, and adaptability are also considered in the prototype since the intent is to extend the prototype to fulfill capabilities required by the system. The developed prototype is evaluated by the end user to accumulate comments that result in the refinement of the documented requirements, design, and the prototype itself. This rapid prototyping approach is iterative and is repeated for each incremental tool capability.

3.2 ISE Development Infrastructure

The ISE system architecture reflects a networked heterogeneous environment incorporating several COTS products and a few developed or customized applications. The planned ISE architecture has been detailed in the ISE System Architecture Document dated 30 January 1995. The documented architecture depicts an environment which is flexible and supportive for incrementally adding tools as new needs and requirements are levied against the ISE. Exhibit 3.1-1 reflects the network/computational infrastructure of the ISE. Note that the infrastructure depicted also serves as the computational infrastructure necessary to support ISE development.

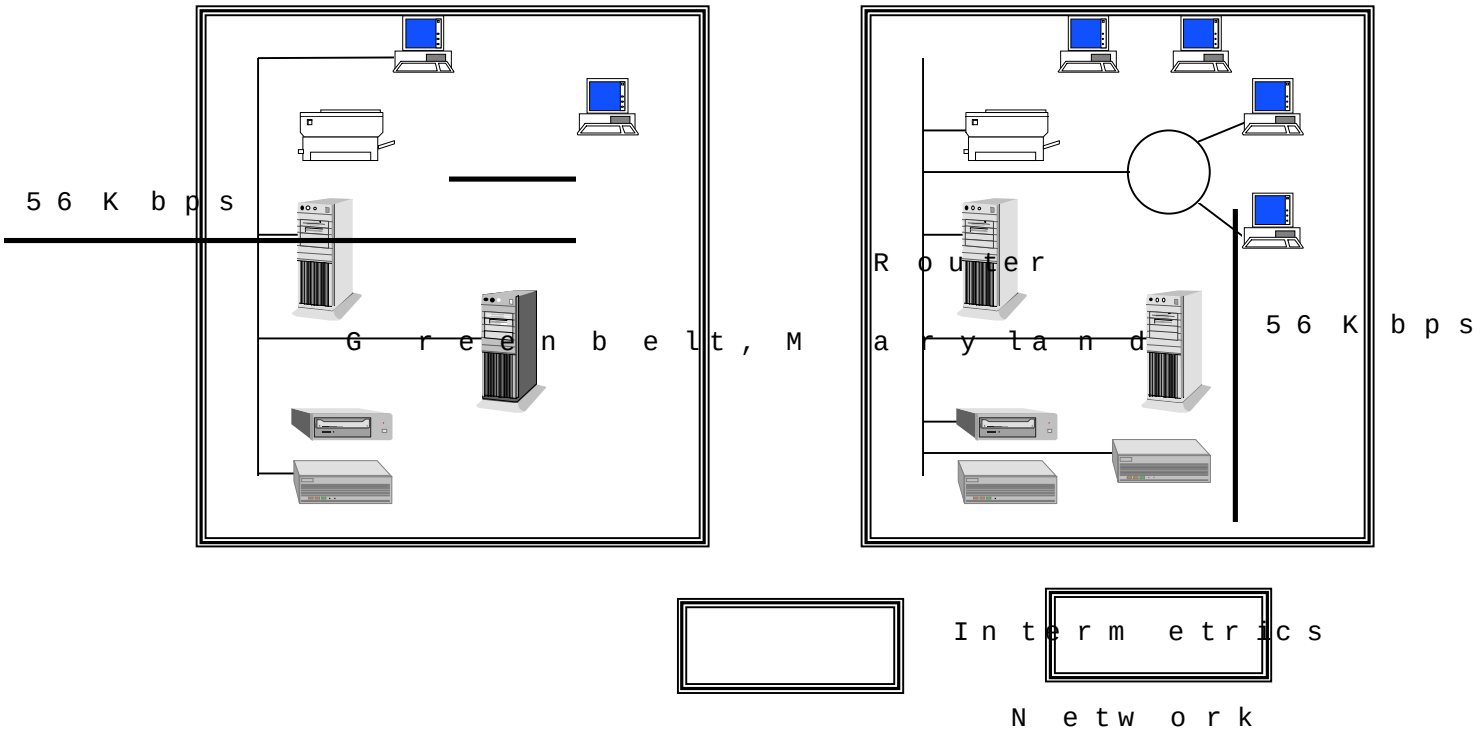


Exhibit 3.1-1 Network/Computational Infrastructure

In addition to the network/computational infrastructure, a high level understanding of the development infrastructure can be garnered from Exhibit 3.1-2, ISE Development Infrastructure. This exhibit depicts many of the COTS tools which are a part of the ISE as well as the tools necessary to satisfy tool development undertakings.

Solaris 2.

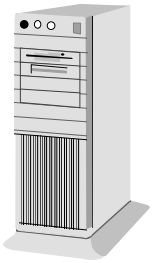
•Sybase SQL Server

•X Runner

•HTTP Server

•Web Genera

•Acrobat Reader



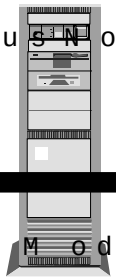
Mac OS

•MS Office

•MS Project

•Acrobat Reader

•Lotus Notes



Laptop Tools

•Fax Modem

•PCMCIA Ethernet Adapter Card

•see DOS/Windows

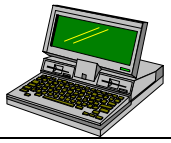


Exhibit 3.1-2 ISE Development Infrastructure

For additional information concerning the ISE network/computational infrastructure and ISE Toolbox tools, refer to sections 5.2.1 and 5.2.2 of the ISE System Architecture Document dated 30 January 1995.

3.3 Tool Development Overview

Based upon identified EOSDIS IV&V tool needs, development activities have been initiated where no COTS solution exists that satisfies levied requirements. These development initiatives are limited to database and homepage applications. These types of applications yield benefits that enhance communications, automate labor intensive processing, provide support for working at geographically dispersed sites, and promote sharing of information. As a result of these benefits, IV&V activities yield higher quality products in a more timely and efficient manner.

3.3.1 Client/Server Development

The development of three client/server applications are targeted to support existing EOSDIS IV&V activities. These applications include:

- the Automated Requirements Database (ARDB),
- the Test Management Database (TMDB), and
- the RTM-to-ISE Utility.

Refer to section 4 of this document for detailed descriptions of these applications and the associated users guide information. These applications are being developed using the Gupta SQLWindows client/server development tool. SQLWindows is a Rapid Application Development (RAD) tool which allows for rapid prototyping of the graphical user interface (GUI) using a GUI builder. Once the interface is constructed, functionality is provided to associate database data from any number of COTS database management systems with the painted interfaces. Application code is then generated by SQLWindows to build the client/server application which can be deployed at various remote sites on as many PCs as desired without run-time fees. All applications read data from the RTM/Oracle database and store application data in a Sybase SQL Server database. The server databases will reside at the location where the majority of access is expected so that client/server application performance is maximized. During development, the prototype applications will communicate with databases located at the NASA/WVU Software IV&V Facility located in Fairmont, WV.

3.3.2 Lotus Notes Development

The development/customization of three Lotus Notes applications has been completed in support of existing EOSDIS IV&V activities. These applications include:

- the Issue/Discrepancy Handling System (IDHS),
- the Data Management Database (DMDB), and

- the Tech Talk Database.

Users guide information for the IDHS is delineated in section 4 of this document since this application supports all IV&V tasks. Note that no users guide information is included for the DMDB and Tech Talk applications due to the simplicity of the interfaces and the on-line help information that is provided within the applications.

Lotus Notes is a groupware tool that promotes information sharing in both Local Area Network (LAN) and Wide Area Network (WAN) environments. Data sharing in the WAN environment is achieved through database replication (syncing up databases on a scheduled or impromptu basis). The aforementioned Lotus Notes applications were developed since the information to be maintained did not require relational database support, would not result in numerous replication conflicts, and was primarily targeted for internal IV&V team access.

3.3.3 Microsoft Access Development

One Microsoft Access application is maintained as a part of the ISE. The Interface Analysis Database (IADB) was developed in support of interface analysis activities so that some level of automation could be achieved in performing consistency and completeness analysis. The IADB application is LAN limited due to performance limitations with running a Microsoft Access application over the WAN or via dial-in. Data (e.g. reports) which must be shared with the external user community is uploaded to the IADB homepage for WWW viewing. User interface information for the IADB is documented in section 4 of this document.

4. User's Guide Information

4.1 Automated Requirement Database (ARDB)

The Automated Requirements database is designed to support the monitoring and requirements management during the development of the EOSDIS Core System (ECS). The purpose of this tool is to facilitate a systematic requirements analysis of the requirement documents produced by the various organizations and supporting contractors. It also defines the links between the requirements and specific integration, verification, and validation tests which will be performed. The ARDB collects the results of requirements evaluation in terms of a numerical rating and the engineering rationale that substantiates the rating. The ARDB assists analysts in browsing requirements, reviewing evaluation criteria, assessing the traceability analysis, recording evaluations, identifying requirements with high ratings, and generating reports on the analysis.

4.1.1 ARDB Installation and Startup

The ARDB application requires remote access to both an Oracle database maintained by the RTM tool and a Sybase database where the requirements analysis data is stored. In order to connect to these remote databases network connectivity software is used. Open Client is used to connect to Sybase. SQLNet is used to connect to Oracle. These products must be installed on the client machine before the ARDB executable software is loaded. After the connectivity software is installed and tested a C:\ARDB subdirectory should be created on the client machine. In this subdirectory will be placed: a copy of the executable code, the necessary report files, and the deployment files supplied by Gupta for SQLWindows applications.
See Appendix A for detailed instructions on Open Client installation.
See Appendix B for detailed instructions on SQLNet installation.
See Appendix C for a listing of the deployment files.

4.1.2 ARDB GUI

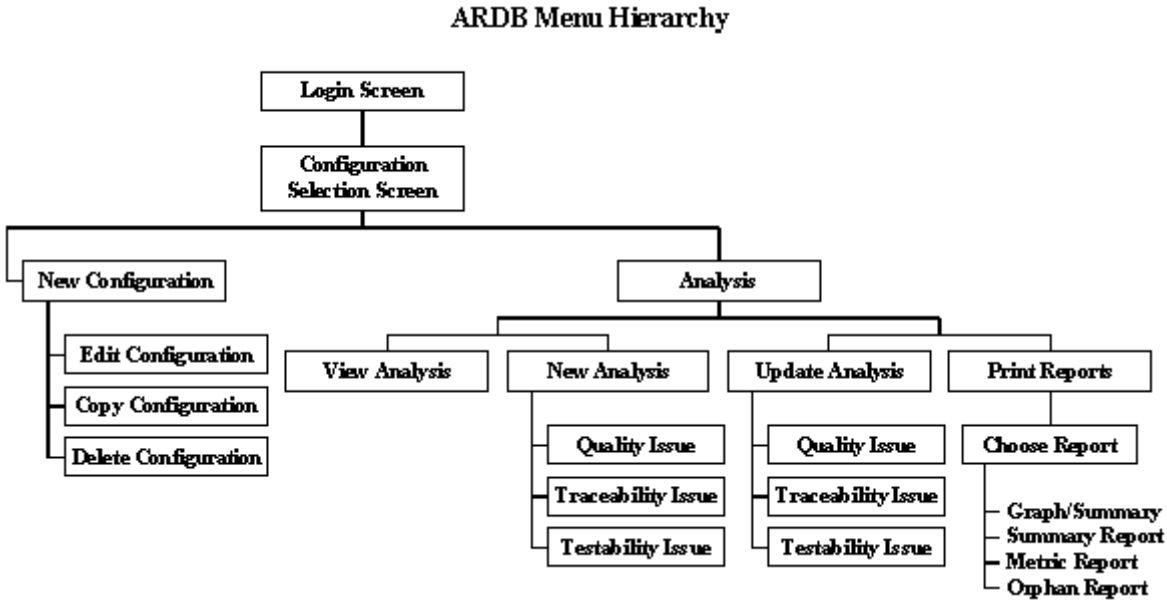


Exhibit 4.1.2-1 ARDB Menu Hierarchy

Exhibit 4.1.2-1 represents the hierarchy of menu choices presented in using the ARDB. The following subsections detail the user interface design for the ARDB.

4.1.2.1 ARDB Login Screen

The ISE ARDB Login screen controls access to the tool by requiring a user to enter a name and a password. A user identification code is captured and stored in the data base with the results of the requirement analysis so that all analysis can be tracked to the individual who entered it. Based on login users are permitted different levels of access. There are three levels of access: supervisor, analyst, and read-only. Users with supervisor level of access may create new users and change the nature of the tools interface in terms of RTM file dates and values displayed as issue criteria on the issue entry screens. Users with analysis level of access may create new configurations of requirements, save them to the database, enter issues to the database, and edit existing issues. Users with read-only access can read issues and print reports of existing analysis data but may not modify or enter data.

FIELDS:

1. Login Name
   The Login Name text field accepts users login name for verification as an assigned user and setting of the appropriate access level.
2. Password
   The Password text field accepts a user defined password for verification of validity. Passwords may be changed by typing `pass` as login name. This activates a dialog box which will verify the existing password and then save a new one.

BUTTONS:

1. Login
   This button checks the validity of the login name entered and if valid invokes the Configuration Selection screen.
2. Cancel
   This button exits the ARDB tool without logging in.

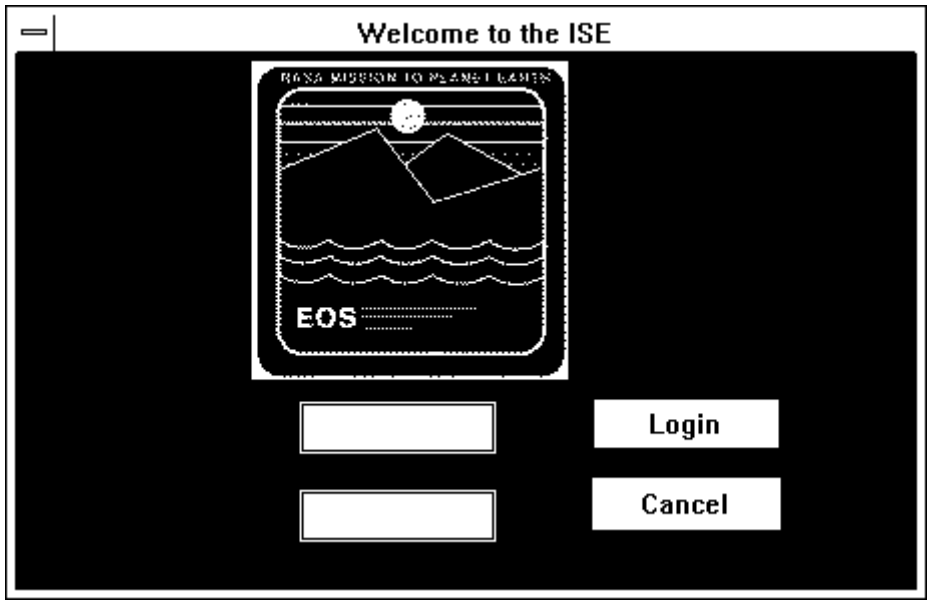


Exhibit 4.1.2-2 ARDB Login Screen

4.1.2.2 ARDB Configuration Selection Screen

The Configuration Selection Screen enables users to select a previously defined requirements analysis configuration or create a new one. A configuration consists of a particular set of requirements under analysis. Configurations are categorized in terms of RTM class, System, Release, RTM file date, a unique Configuration ID, date of configuration creation, and a brief description. If the user chooses to produce a new configuration the New button is selected and the New Configuration Screen appears. Configurations may also be copied, deleted, or edited by pressing the corresponding button. The user may begin the analysis process by pressing the analysis button to open the Select Requirement Screen.

FIELDS:

1. Configuration ID
   The Configuration ID text field displays a key created by the analyst to distinguish the requirements analysis effort currently being completed and each Configuration ID must be unique.
2. Configuration Description

The Configuration Description text field displays a brief description of the configuration.

MENU ITEMS:

1. Exit
   Choose this option to close the window and exit the ARDB application.
2. Configuration
   Offers same selections as the screen buttons (see Buttons).
3. Maintenance
   Choose this menu item to invoke the maintenance screen. The maintenance screen is used by personnel with a supervisory level of access to control choices available through combo boxes on the analysis entry screens, add RTM version dates to the menu choices when new dumps of the RTM data become available, to add new users, and to set access levels.

BUTTONS:

1. New
   This button invokes the New Configuration screen (see section 4.1.2.3 ARDB New Configuration Screen).
2. Edit
   This button invokes the Edit Configuration screen to modify an existing Configuration (see section 4.1.2.4 ARDB Edit Configuration Screen).
3. Copy
   This button produces a copy of an existing Configuration
4. Delete
   This button deletes a Configuration
5. Analysis
   This button starts analysis on the requirements in the highlighted Configuration (see section 4.1.2.5 ARDB Analysis Requirement Selection Screen)
6. Exit
   This button closes the window and exits the ARDB application.

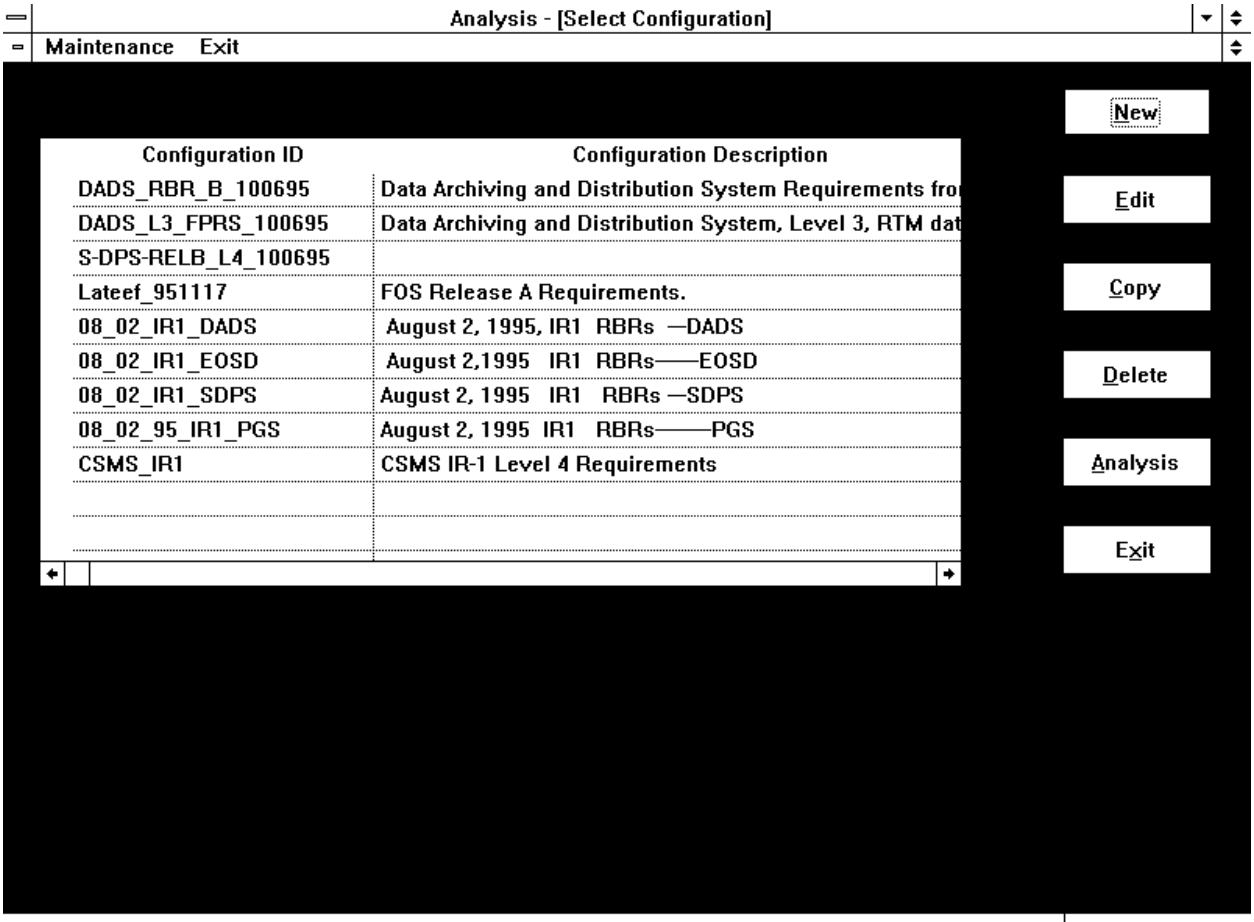


Exhibit 4.1.2-3 ARDB Configuration Selection Screen

4.1.2.3 ARDB New Configuration Screen

The New Configuration Screen permits users to outline a new set of requirements or to define a new area of analysis by setting the limits of a set of requirements. The Configuration ID and the Configuration Description are defined by the user. These fields allow the user to resume the analysis at a later date if not completed and allow multiple analysts to work on the same set of requirements. The System, RTM Class, and Release are part of the selection criteria and are pulled from the RTM database. They are used in querying the RTM database for existing requirements that are needed for analysis. The RTM File Date allows the user to select which version of the requirements from HAIS are to be analyzed. The RTM File Date information is maintained by administrative personnel.

FIELDS:

1. RTM File Date
   The RTM File Date combo box pulls down to display a list of available versions of the RTM/Oracle data. Select one of the dates by clicking on it.

2. System
   The System combo box pulls down to display a list of the ECS systems. Select one of these or the asterisk (all) as one element in defining an analysis configuration. This is an editable field and values may be entered to define an area of analysis.
3. RTM Class
   The RTM Class combo box pulls down to a list of the RTM classes (levels) of requirements based on the RTM file date. The user selects one of these as one element in defining an analysis configuration.
4. Release
   The Release combo box pulls down to display a list of releases based on the RTM. file date and RTM class. This box is active only if the RTM class selected has a release associated with it.
5. Configuration ID
   Enter a unique string identifying the configuration.
6. Configuration Description
   Enter a brief description of the configuration.
7. Requirement ID - Table Column
   The Requirement ID text column of the table displays a list of the requirement identification number (PARAGRAPH_ID in RTM) for all the requirements in the configuration..
8. Requirement Text - Table Column
   The Requirement Text column of the table displays a list of the text of the requirements as stored in RTM/Oracle.

BUTTONS:

1. Populate Table
   This button queries the RTM/Oracle database with the criteria selected and displays the results in the table.
2. Save
   This button saves the configuration.
3. Exit
   This button closes the window and returns to the Select Configuration Screen.

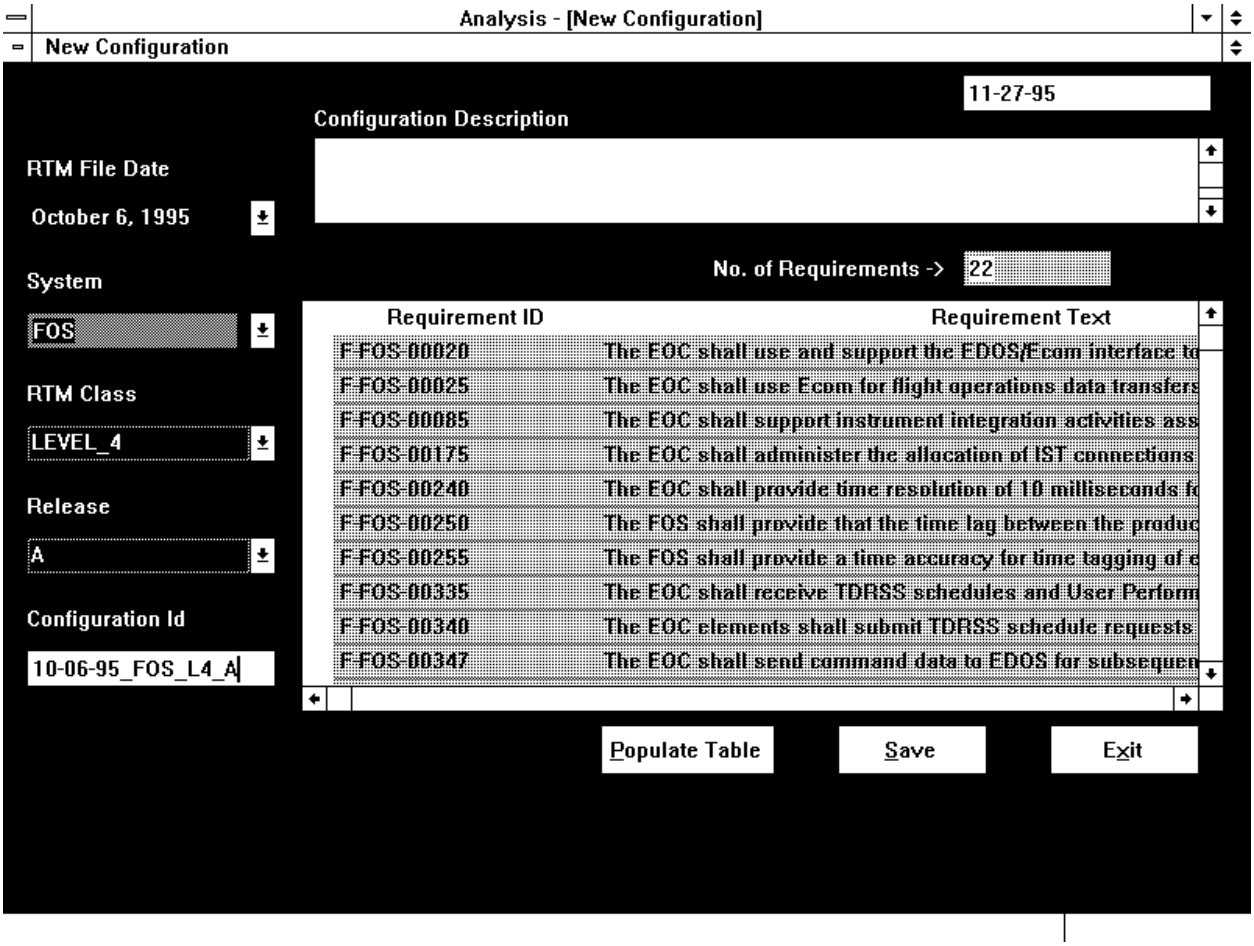


Exhibit 4.1.2-4 ARDB New Configuration Screen

4.1.2.4 ARDB Edit Configuration Screen

The Edit Configuration screen permits users to modify an existing configuration. The appearance of the screen and all fields and buttons are identical to the New Configuration screen.

4.1.2.5 ARDB Analysis Requirement Selection Screen

The Analysis Requirement Selection Screen enables the user to select a particular requirement for analysis from the current configuration.

FIELDS:

1. System
   The System text field displays the system associated with the current configuration.
2. RTM Class
   The RTM Class text field displays the RTM class associated with the current configuration.
3. Release
   The Release text field displays the Release associated with the current configuration.

4. Configuration
   The Configuration text field displays the configuration identifier text string.
5. Requirement ID - Table Column
   The Requirement ID text column of the table displays the requirement identification number (PARAGRAPH_ID in RTM).
6. Requirement Text - Table Column
   The Requirement Text column in the table displays the actual wording of the requirement as stored in RTM/Oracle.
7. Clarification Text - Table Column
   The Clarification Text column in the table displays any additional text stored in the RTM/Oracle database pertaining to each individual requirement.

The table fields are populated from the RTM/Oracle database based on a query stored with each configuration.

BUTTONS:

1. NEW
   This button invokes the Requirement Analysis screen and begins the analysis of the highlighted requirement. If an analysis has already been started the user will be prompted to use UPDATE.
2. VIEW
   This button invokes a view window that is identical to the Requirement Analysis screen but operates in a read-only mode.
3. UPDATE
   This button invokes the Update Requirement Analysis screen for modification of existing analysis data or to add analysis data.
4. EXIT
   This button closes this window and returns to the Configuration Selection screen.
5. Print Reports
   This button invokes a dialog box that displays buttons for each of the available reports.

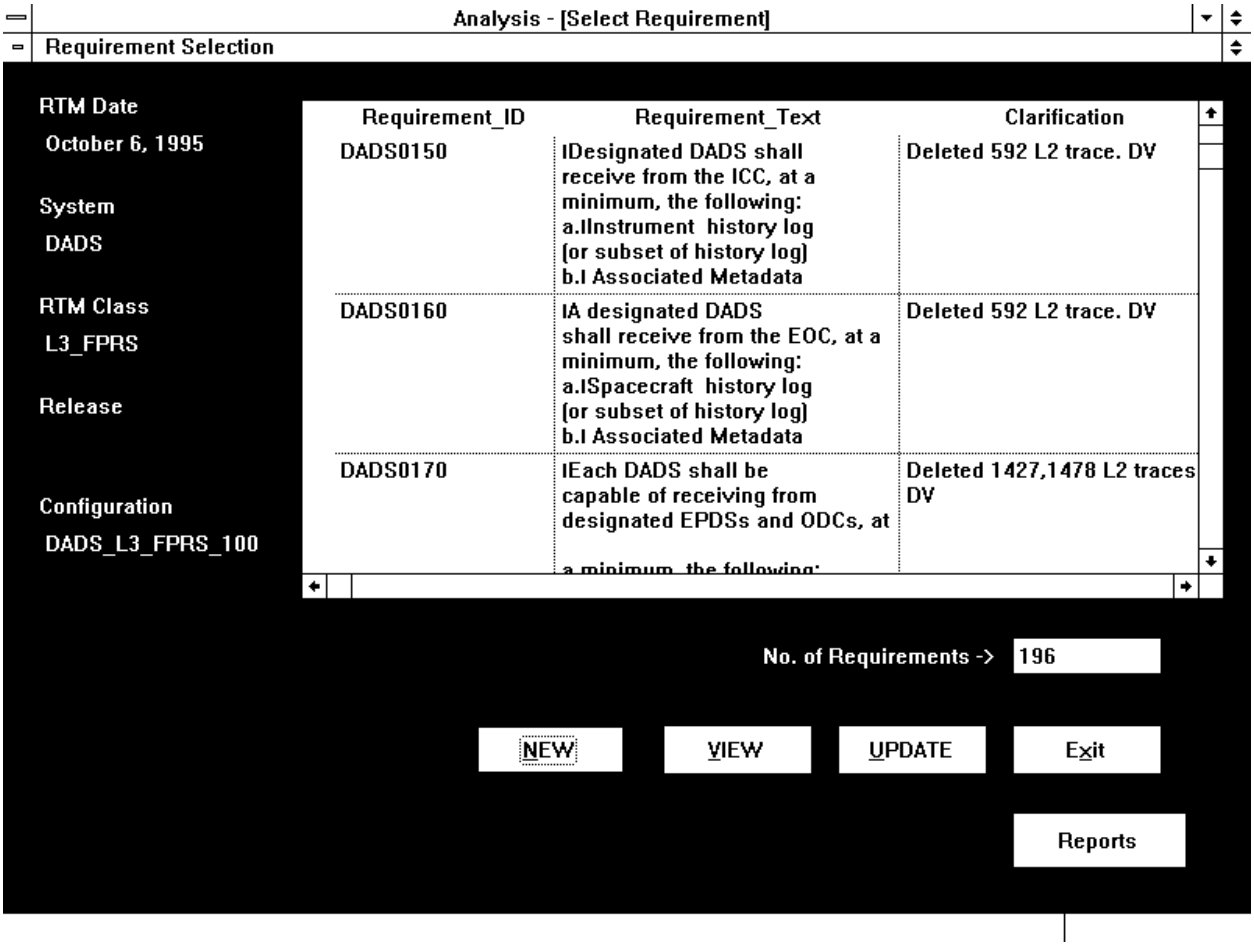


Exhibit 4.1.2-5 ARDB Requirement Analysis Selection Screen

4.1.2.6 ARDB Requirement Analysis Screen

The ARDB Requirement Analysis screen displays an individual requirement and any analysis issues associated with it.

FIELDS:

1. Analyst
   The Analyst text field displays the analyst name associated with this analysis.
2. Date of Analysis
   The Date of Analysis field displays the date the analysis takes place.
3. Requirement ID
   The Requirement ID text field displays the requirement identification number (PARAGRAPH_ID in RTM).
4. Configuration
   The Configuration text field displays the configuration identification test string for the requirement under analysis.

5. RTM Class
   The RTM Class field displays the identifying class label associated with the requirement under analysis.
6. Requirement Text
   The Requirement Text field displays the actual wording of the requirement as stored in RTM/Oracle.
7. Clarification Text
   The Clarification Text field displays any additional text stored in RTM/Oracle pertaining to this requirement.
8. Issue Type - Table Column
   The Issue Type text column portion of the table displays the type of issue (Quality Testability, or Traceability).
9. Issue - Table Column
   The Issue text column portion of the table displays the actual issue addressed.
10. Description - Table Column
    The Description text column portion of the table displays the analyst's description of the issue.
11. Recommendation - Table Column
    The Recommendation text column portion of the table displays the analyst's recommendation.
12. Problem Class - Problem Class
    The Problem Class text column portion of the table displays the class of problem defined by the analyst (see quality, testability and traceability screen sections for listing of problem classes).

The Requirement ID and Requirement Text are drawn from the RTM/Oracle database. All remaining fields are populated from the Sybase database.

BUTTONS:

1. Add Issue
   This button enables users to add an issue associated with the requirement under analysis. A dialog box is invoked which prompts the user to choose either Quality, Testability or Traceability.
2. Delete Issue
   This button deletes an issue that has been highlighted. The user is prompted for verification then the deletion is carried out.
3. Edit Issue
   This button enables users to edit an issue that has been highlighted.
4. Traceability
   This button displays the Trace Analysis screen (see section 4.1.2.7 ARDB Trace Analysis Screen).
5. Save
   This button to saves all data to the database.
6. Exit
   This button closes the window without saving.

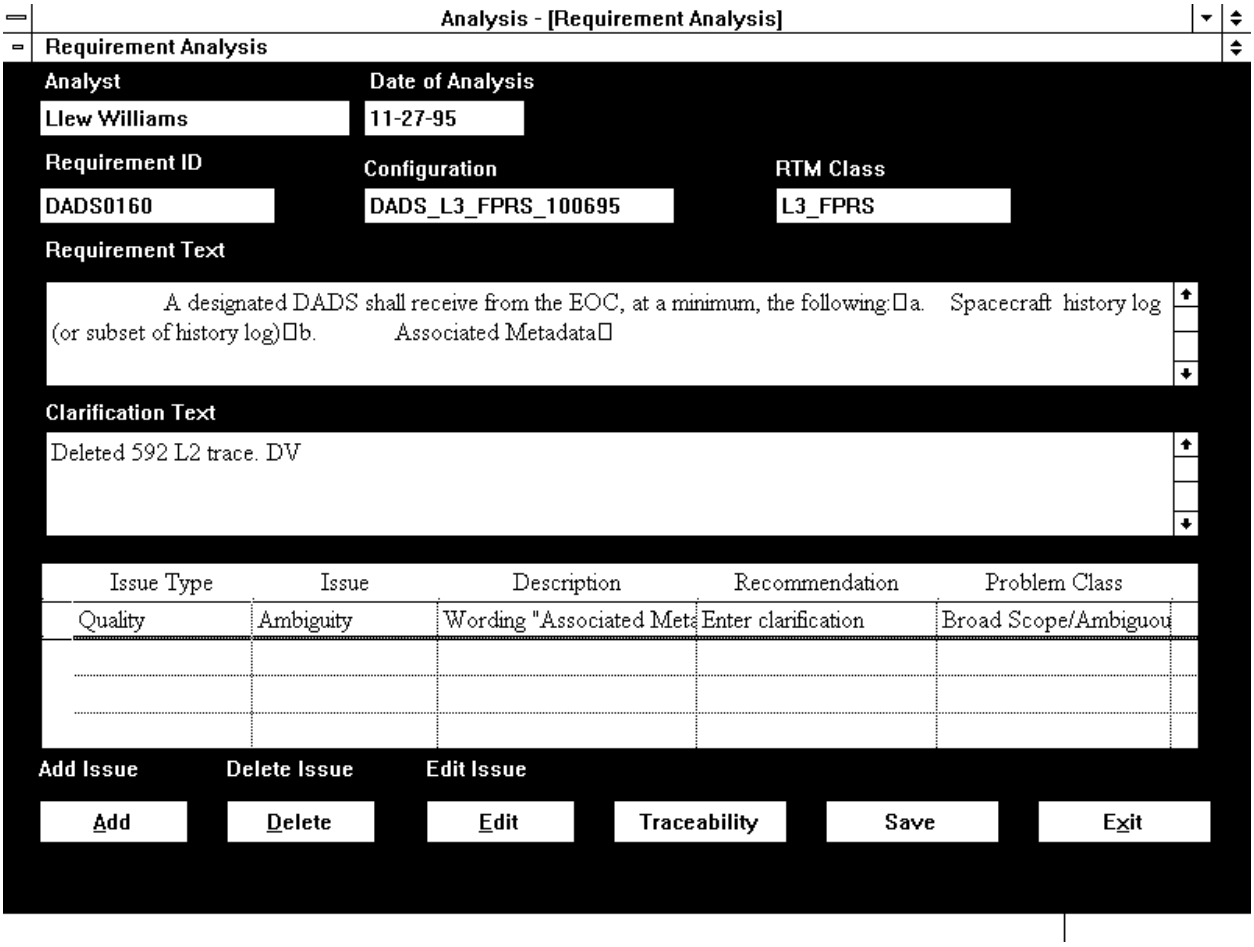


Exhibit 4.1.2-6 ARDB Requirement Analysis Screen

4.1.2.7 ARDB Trace Analysis Screen

The ARDB Trace Analysis screen displays all traceability information pertaining to the individual requirement currently under analysis. It displays class information, Requirement Id's, and text for all linked requirements.

FIELDS:

1. Paragraph_Id - Table Column in Parent Requirements Table
   The Paragraph_Id column in this table displays the Paragraph_Id's as stored in the RTM/Oracle database. All requirements are displayed that have a link from above to the requirement under analysis. Double clicking on this field causes the appropriate text to be displayed in the Parent Text field.
2. Class - Table Column in Parent Requirements Table
   The Class column in this table displays the class of each requirement linked from above to the requirement under analysis.
3. Paragraph_Id - Table Column in Child Requirements Table

The Paragraph_Id column in this table displays the Paragraph_Id's as stored in the RTM/Oracle database. All requirements are displayed that have a link from below to the requirement under analysis.

4. Class - Table Column in Child Requirements Table
   The Class column in this table displays the class of each requirement linked from below to the requirement under analysis.
5. Parent Text
   The text of the requirement as stored in RTM/Oracle is displayed here. This field is populated by double clicking the Paragraph_Id field in the Parent Requirements table.
6. Child Text
   The text of the requirement as stored in RTM/Oracle is displayed here. This field is populated by double clicking the Paragraph_Id field in the Child Requirements table.

All data fields are populated from the RTM/Oracle database.

BUTTONS:

1. Exit
   This button closes the Trace Analysis window and returns to the Requirement Analysis screen.

4.1.2.8 ARDB Analysis Quality Screen

The Analysis Quality screen enables users to enter issues relating to quality.

FIELDS:

1. Issue
   The Issue combo box pulls down to display the categories: Ambiguity, Completeness, Consistency, Flexibility (these categories may be modified by users with supervisory access).
2. Problem Class
   The Problem Class combo box pulls down to display the categories: Inconsistent Level of Detail, Incomplete Requirement, Redundant Requirement, Broad Scope/Ambiguous Wording(these categories may be modified by users with supervisory access).
3. Issue Description
   The Issue description multi-line field captures an analyst's description of the issue.
4. Issue Recommendation
   The Issue Recommendation multi-line field captures an analyst's recommendation for correcting the issue.
5. Quality Rating
   The Quality Rating combo box pulls down to display the categories: No Problem, Minor Problem, Moderate Problem, Major Problem.

All data fields are stored in the Sybase database.

BUTTONS:

1. OK
   This button places the data captured on this screen into memory in preparation for saving into the database. The window is closed and control returns to the Requirement Analysis window after the data is saved.
2. Cancel
   This button closes the window without saving any data and returns to the Requirement Analysis window.

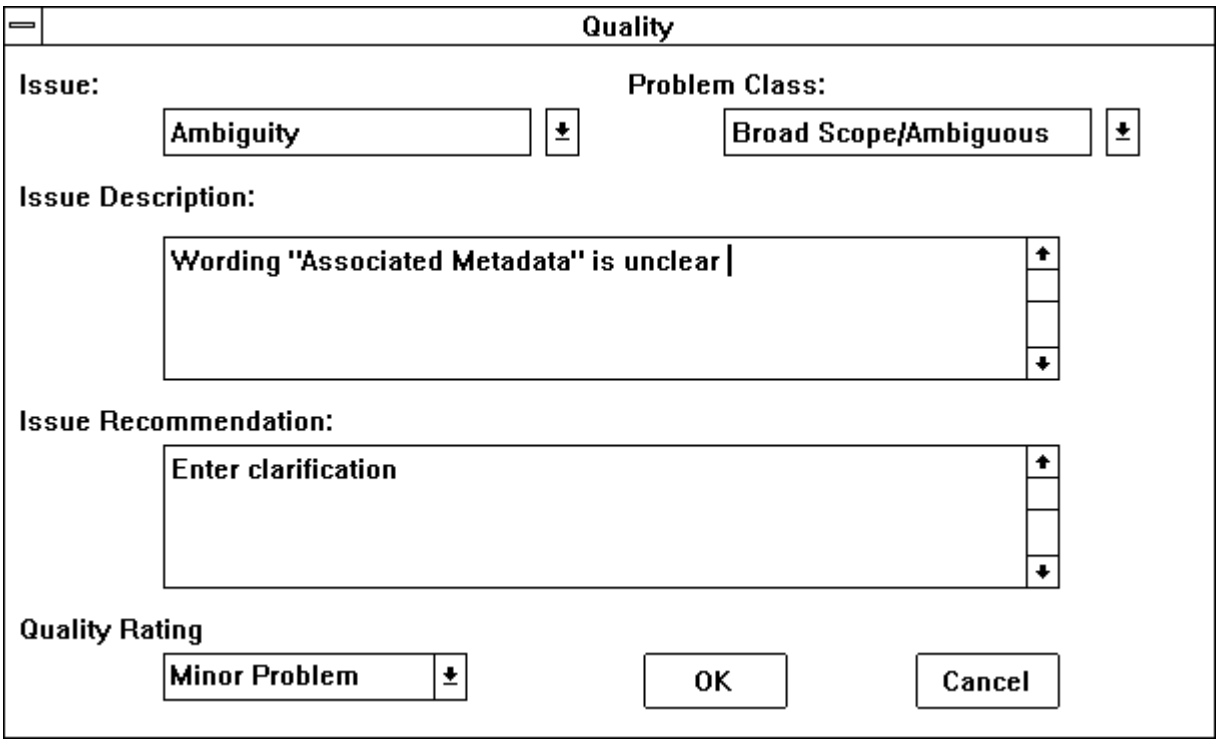


Exhibit 4.1.2-7 ARDB Analysis Quality Screen

4.1.2.9 ARDB Analysis Testability Screen

The Analysis Testability Screen is used to capture data pertaining to testability issues identified during the requirement analysis.

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FIELDS:

1. Issue
   The Issue combo box pulls down to display the categories: Acceptance Criteria, Clarification needed, Not testable.
2. Problem Class
   The Problem Class combo box pulls down to display the categories: No quantitative criteria, Not enough info to suggest test approach, Not testable.

3. Issue Description
   The Issue description multi-line field captures an analyst's description of the issue.
4. Issue Recommendation
   The Issue Recommendation multi-line field captures an analyst's recommendation for correcting the issue.
5. Testability Rating
   The Testability Rating combo box pulls down to display the categories: No Problem, Minor Problem, Moderate Problem, Major Problem.

All data fields are stored in the Sybase database.

BUTTONS:

1. OK
   The OK button places the data captured on this screen into memory in preparation for saving into the database when analysis is complete. The window is closed and control returns to the Requirement Analysis window after the data is stored.
2. Cancel
   The Cancel button closes the window without saving any data and returns control to the Requirement Analysis window.

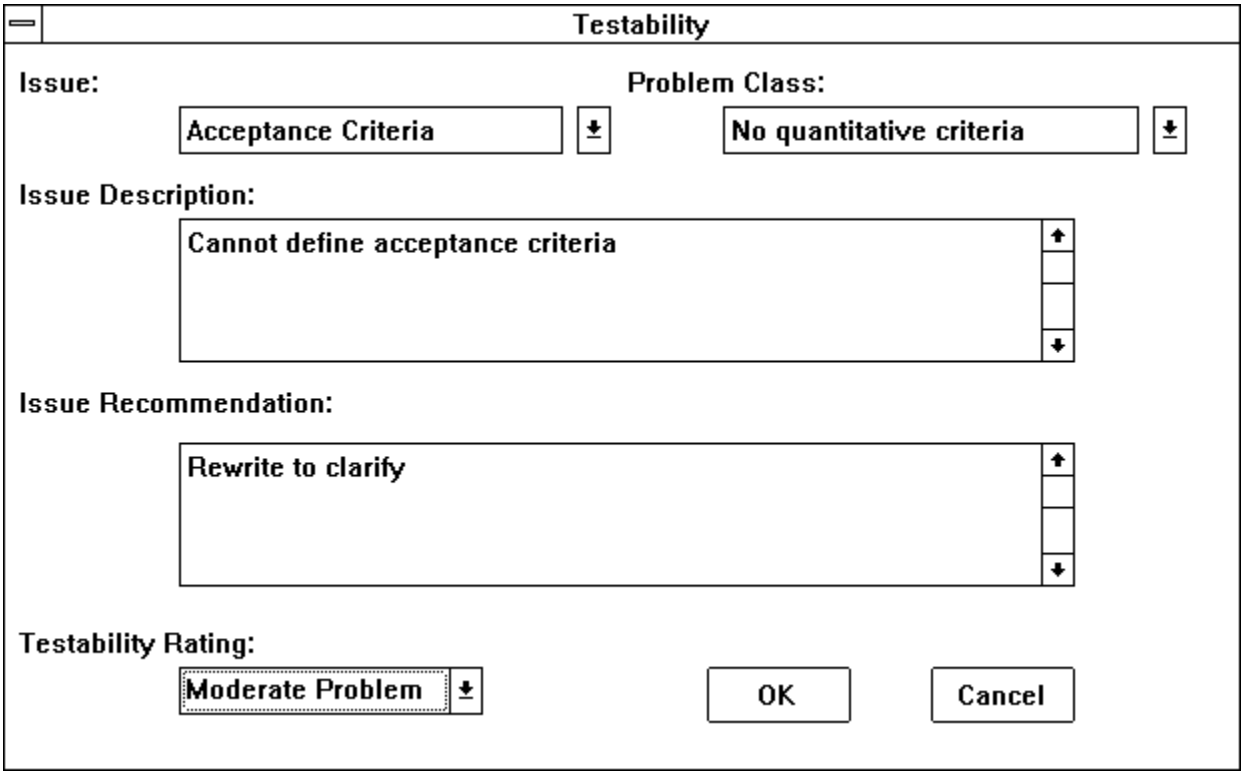

Exhibit 4.1.2-8 ARDB A nalysis Testability Screen

4.1.2.10 ARDB Analysis Traceability Screen

The Analysis Traceability Screen is used to capture data pertaining to traceability issues identified during the requirement analysis.

FIELDS:

1. Issue
   The Issue combo box pulls down to display the categories: Missing, Orphan, Weak.
2. Problem Class
   The Problem Class combo box pulls down to display the categories: No Valid Trace Specified, Questionable Trace.
3. Issue Description
   The Issue description multi-line field captures an analyst's description of the issue.
4. Reqm't ID
   The Reqm't ID field captures the requirement identification number of the requirement linked to the requirement under analysis.
5. Class
   The Class text field captures the RTM class of the requirement that is linked to the requirement under analysis.
6. The Traceability Rating combo box pulls down to display the categories: No Problem, Minor Problem, Moderate Problem, Major Problem.

All data fields are stored in the Sybase database.

BUTTONS:

1. Delete Trace
   The Delete Trace radio button captures a recommendation of "Delete Trace" when selected.
2. Add Trace
   The Add Trace radio button captures a recommendation of "Add Trace" when selected.
3. OK
   The OK button places the data captured on this screen into memory in preparation for saving into the database when analysis is complete. The window is closed and control returns to the Requirement Analysis window after the data is saved.
4. Cancel
   The Cancel button closes the window without saving any data and returns control to the Requirement Analysis window.

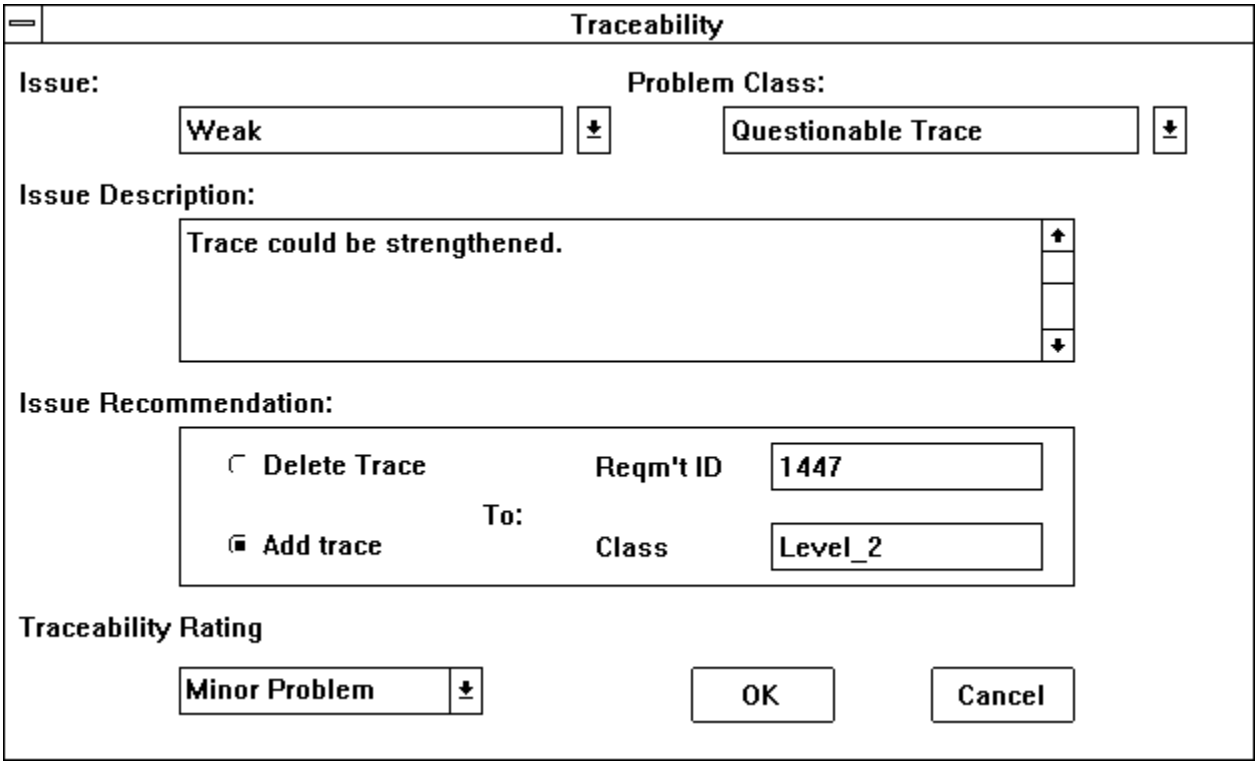

Exhibit 4.1.2-9 ARDB Analysis Traceability Screen

4.1.2.11 ARDB Report Selection Screen

The Report Selection Screen provides the means to generate reports based on specific criteria. Overall summary reports are available as well as reports specifically focused on traceability or quality issues. Other reports will be made available in future releases of the application as users' needs become more clearly defined.

BUTTONS:

1. Graph/Summary Report
   This button displays a report of all issues associated with the current configuration of requirements. The issues grouped by type. A pie graph representing the breakdown of issues by type is displayed at the top of the report with a count for each type. Requirement Id, Description, and Recommendation fields are displayed.
2. Summary Report
   This button displays a report of all issues associated with the current configuration of requirements. The issues are grouped by type. Requirement Id, Description, and Recommendation fields are displayed.
3. Metric Report
   This button displays a report containing the severity rankings associated with the requirement issues in the current configuration of requirements. The ratings are

grouped by type and a count for each type is included. Paragraph_Id, Quality rating, Testability rating, and Traceability rating are displayed.

4. Orphan Report
   This button invokes the Orphan Reports screen which enables users to make a choice of direction and class to build a query to the RTM/Oracle database. The Requirement Id's returned from this query are displayed in the report. The requirements contained in the report consist of those with no links to the selected class. Only Paragraph_Id is displayed.
5. Traceability Report
   This button displays a report of all traceability issues associated with the current configuration of requirements. Requirement Id, Traceability rating, Description, and Recommendation are displayed.
6. Close
   The Cancel button closes and returns control to the Requirement Selection window.

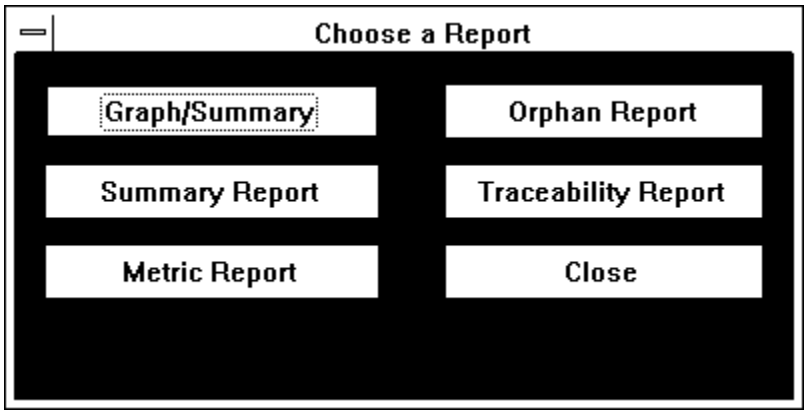

Exhibit 4.1.2.10 ARDB Report Selection Screen

4.1.2.11.1 ARDB Orphan Reports Selection Screen

FIELDS

1. For Class
   The Class field displays the currently selected class in red text.
2. Class - Table Column
   The Class column in the table lists all classes with a link to the currently selected class. This column is populated after the Down or up button is clicked. A link class is chosen by double clicking on a class in this column.

BUTTONS:

1. Down
   The Down button populates the class table column with a list of all classes with a link to the currently selected class in a downward direction (for example: LEVEL_3 to LEVEL_4).
2. Up

The Up button populates the class table column with a list of all classes with a link to the currently selected class in an upward direction (for example: LEVEL_3 to LEVEL_2).

3. Display Report
   The Display Report button builds a report listing the Paragraph_Ids of all orphan requirements between the selected classes.
4. EXIT
   The EXIT button closes the window and returns to the Requirement Analysis Selection screen.

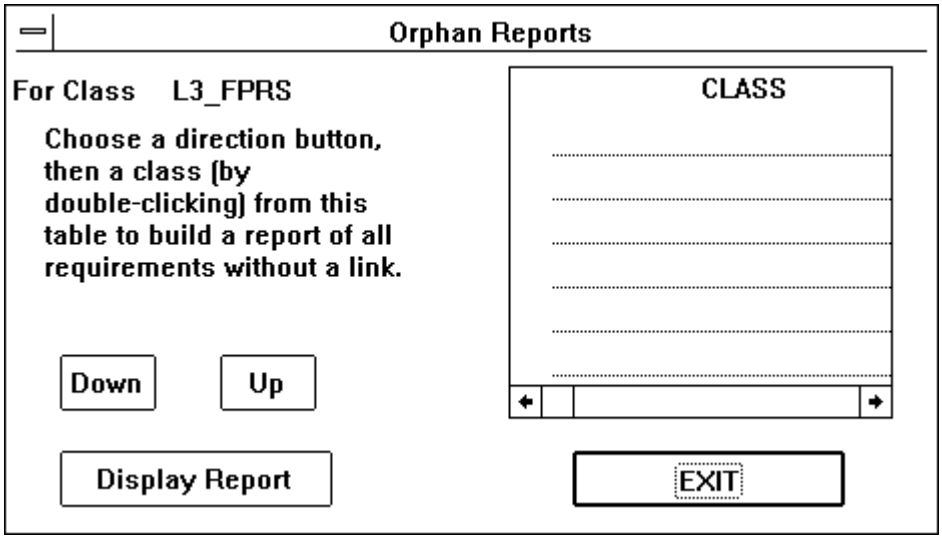

Exhibit 4.1.2.11 ARDB Orphan Reports Selection Screen

4.1.3 ARDB Messages

The messages supplied by the ARDB to users are listed below.

4.1.3.1 Informational Messages

Login Failed - Please Try again

4.1.3.2 Warning Messages

WARNING - You are about to DELETE a record from the database!
WARNING - No Requirement selected Please Make a Selection
WARNING - You are about to save to the DATABASE
WARNING - You are about to exit without saving, Current analysis data will be lost

4.1.3.3 Error Messages

Error in Selection - No Configuration Selected Please Click on a Configuration
ERROR - No Criteria selected
ERROR: No Configuration ID - Please enter an ID for this Configuration
ERROR - Unable to locate a record for this Requirement

4.2 Issue /Discrepancy Handling System (IDHS)

The IDHS is a Lotus Notes database application used to compose, review, submit and approve Review Item Discrepancies (RIDs) and Issues. RIDs are written for discrepancies found at any formal review. There are two types of issues. One written for EOSDIS IV&V issues (external) and the other written for issues that are internal to the IV&V team. Users of the system can browse the data base through different views designed to present the records in desired formats. Records are categorized to make it easy to find information on individual items or groups of items. Reviewers who are authorized to submit RIDs to NASA can select and submit individual or multiple RIDs automatically. The application prepares the RIDs in the required format and interfaces with E-mail for submittal.

4.2.1.1 IDHS Installation and Startup

Lotus Notes is a groupware product that promotes dissemination of information in a team environment. In order to run IDHS a client copy of Lotus Notes and E-mail provided by ccMail must be installed on the client machine. First time users may need to update the EOSDIS address book, add the IDHS database to a folder and add the E-mail Icon to the tool bar.

4.2.1.1.1 Update Address Book

After starting Lotus Notes, you may need to make changes to your information in the EOSDIS's Address Book. First choose the tab labeled "Address Book" then double click on the "EOSDIS's Address Book" icon. Enter your password (if just starting system) then choose "View - People" to see the names of those listed in the address book. Select your name then choose "View -Edit Mode " or "Edit - Edit Document" from the menu. Fields that the user is allowed to make changes to will have brackets next to them. Make your desired changes and save those changes by choosing "File - Save" then close the personal information window by choosing "File - Close Window ". Then close the names list window by choosing "File - Close Window" again.
If not listed in the "EOSDIS's Address Book", contact your systems administrator.

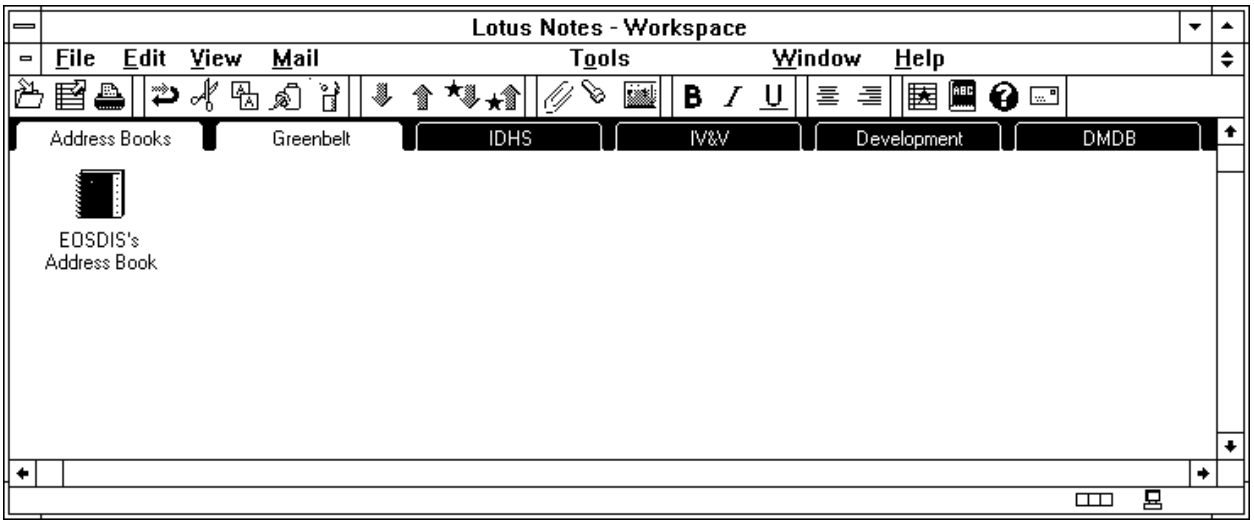

Exhibit 4.2.2-1 Address Book view of Lotus Notes.

4.2.1.1.2 Adding IDHS Database to Folder

First choose the folder where you would like to add the IDHS database icon. Then choose "`File - Open Database`", select "`Notes Server1/EOSDIS`", select "`IDHS Application`" then either select "`Add Icon`" to add its icon to your workspace, or "`Open `" to add its icon and open the database.

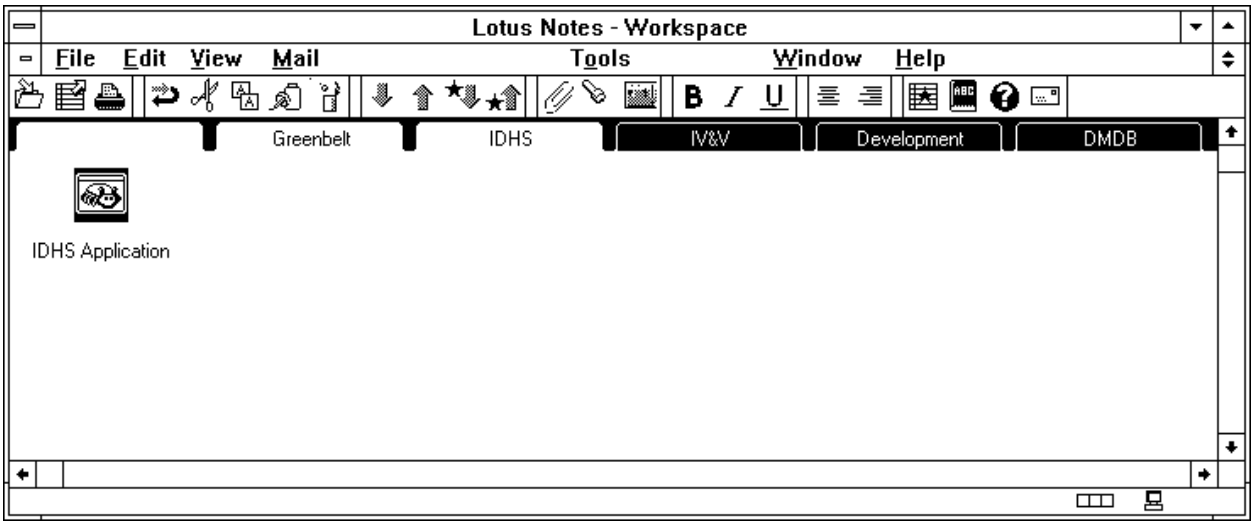

Exhibit 4.2.2-2 Database folder view of Lotus Notes.

An "`About IDHS Application`" document that describes the purpose of the database is automatically displayed the first time you open the database. To view it again, choose "`Help - About IDHS Application`". There is also a document that discusses how to use the database. To view it, choose "`Help - Using IDHS Application`"

4.2.1.1.3 Adding E-mail Icon to Tool Bar

People with "Reviewer" status are the only users who need to add the E-mail icon to their toolbar.

After entering the IDHS database, choose "`Tools - SmartIcons`" from the menu. Scroll down through the choices in the "Available icons" table. Near the end is an envelop icon labeled "Macro Button". Click on that icon and drag it over to the "Default Set" list.

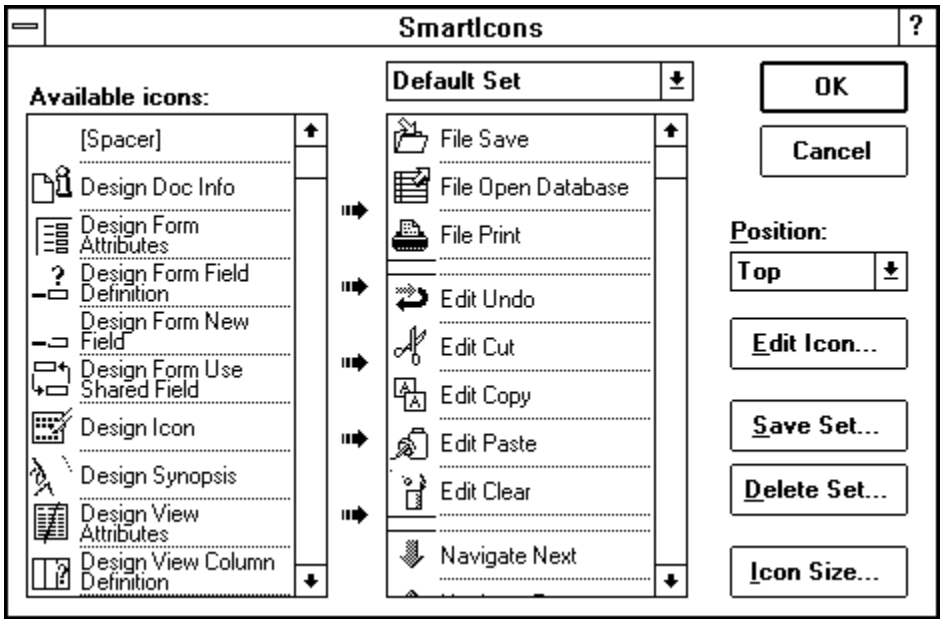

Exhibit 4.2.2-3 SmartIcons view of Lotus Notes

Then select the "`Edit Icon`" button. Type the following new description for the icon "RID Mail". Select the "`Formula`" button and then select the "`Add Command`" button. Scroll down through the list and select "ToolsRunMacro". Then select the "Paste" button and the following will appear in the "Formula" box:

@Command([ToolsRunMacro])

Insert inside the last parenthesis the following:

; "RidMail"

The final result should look like:

@Command([ToolsRunMacro]; "RidMail")

Select the "OK" button, then the "Done" button and the next "OK" button. The new Icon should now appear in the tool bar at the top of the screen.

4.2.2 IDHS GUI

The following sections discuss the graphical user interface for the IDHS application.

4.2.2.1 IDHS Views

The IDHS features many views. A view is a list of documents in a database that is usually sorted or categorized to make finding documents easier. A database can have any number of views. To change views, choose another view from the view menu. Most views are created by the database designer, but a user can create their own views.

`All RIDs Ready to be Mailed:` a view that can be accessed only by those with the power to approve RIDs for submission. Displays all RIDs that have been prepared in text format in preparation for E-mailing to NASA. RIDs are selected and E-mailed from this view.

`By Originator:` lists only RIDs organized by Originator Name.

`Priority (main view):` lists only RIDs organized by Priority.

`By Reference Number:` lists only RIDs organized by Originator Reference Number.

`By Severity:` lists only RIDs organized by Severity.

`By Status:` lists only RIDs organized by Status.

`By Subject:` lists only RIDs organized by Subject.

`By Submission Date:` lists only RIDs organized by Submission Date.

`By System:` lists only RIDs organized by System.

`Issues and RIDs:` lists Issues and RIDs in one view organized by Priority.

`Issues by Priority:` lists Issues only organized by Priority.

`Month Old:` lists all RIDs in the data base that are more than a month old and do not have a Status of "Draft" or "Rejected" or "Resolved".

`Total High Priority/Major Problem:` an experimental view that produces a total number for those RIDs with a high rating in Priority and Severity.

Note: Other custom views will be implemented upon user request. Contact your Notes System Administrator with requests.

4.2.2.2 IDHS RID Submission Form

`To prepare a RID:`

After opening the database, choose "`Compose - 1. RID Submission Form`" from the menu. The information in the top-most six fields is automatically generated from information contained in the

Address Book database. All remaining fields are to be filled in by the originator. Fields that must have inputs are underlined. Help for individual fields may be displayed by clicking on the field title. When the form is completed, select the "`Just Save and Close Window`" button at the bottom of the form.

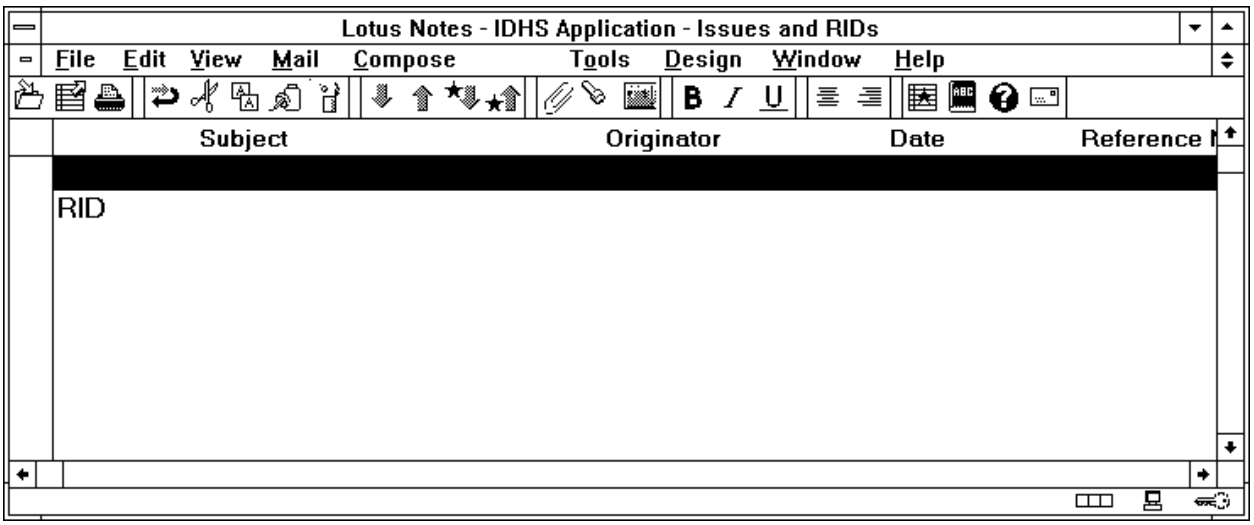

Exhibit 4.2.2-4 IDHS application view of Lotus Notes.

FIELDS:

1. `Originator:` Writer of RID. This field is required for the generation of the E-mail RID that will be submitted to NASA and is automatically generated when the form is first opened in first name, last name format.
2. `Submission Date:` Date RID was first entered into the system. This field is automatically generated when the form is first saved but may be edited and is required for the generation of the E-mail RID that will be submitted to NASA.
3. `Organization:` Originator's organization. This field is required for the generation of the E-mail RID that will be submitted to NASA.
4. `E-Mail Address:` The E-mail address of the originator. This field is automatically generated when the form is first opened and is required for the generation of the E-mail RID that will be submitted to NASA.
5. `Phone Number:` Phone number of originator. This field is automatically generated when the form is first opened and is required for the generation of the E-mail RID that will be submitted to NASA.
6. `Task Number:` This field is automatically generated when the form is first opened or the user may enter the number of the associated task.

EOSDIS RID Form

Originator: ⌜	Submission Date: ⌜
Organization : ⌜	E-Mail Address : ⌜
Phone Number : ⌜	Task Number : ⌜

Exhibit 4.2.2-5 Fields "1-6" of EOSDIS RID Form.

7. `Review:` Enter the system and the type of review being held when the discrepancy was found (ex. FOS PDR). This field is required for the generation of the E-mail RID that will be submitted to NASA.
8. `Document/Presentation:` Name of document being reviewed or presentation attended. This field is required for the generation of the E-mail RID that will be submitted to NASA.
9. `Section:` Section of document being reviewed or presentation attended. N/A may be entered.
10. `Page:` Page of document being reviewed or presentation attended. N/A may be entered.
11. `Figure/Table:` Figure or table in document being reviewed or presentation attended. N/A may be entered.
12. `Category Name:` These will be different for each review. Refer to the RID instructions for the review attended. This field is required for the generation of the E-mail RID that will be submitted to NASA.
13. `Originator Ref:` RID ID number from IV&V contractor. Automatically generated when the form is first opened.
14. `RID ID:` Number assigned by NASA when they open the RID. Input by reviewer when they change the status field of the RID form to "Opened by NASA".

Review : ⌜IDR⌟	Document/Presentation : ⌜
Section : ⌜NA⌟	Page : ⌜NA⌟
Figure/Table : ⌜NA⌟	Category Name : ⌜
Originator Ref: ⌜IVVRID-LW-17⌟	RID ID: ⌜

Exhibit 4.2.2-6 Fields "7-14" of EOSDIS RID Form.

15. `Severity:` Originator assigns a severity of Minor, Moderate or Major according to the harshness of the problem (in originator's opinion).

16. `Priority:` Originator assigns a priority of Low, Medium or High according to how quickly action must be taken (in originator's opinion).
17. `System Affected:` Originator inputs the systems affected from the following choices:
    `EOSDIS` - refers to system wide.
    `ECS` - refers to the EOSDIS Core System developed by HAIS.
    `EDOS` - refers to the EOS Data and Operations System developed by TRW.
    `EBnet` - refers to the EOS Communication System developed by CSC.
    `ETS` - refers to the EOS Test System.
    `Flight Proj:` refers to the Flight Project portion of EOS.
    `ISE` - refers to the Integrated Support Environment of the IV&V team.
    `Other` - to be used for discrepancies that do not fit under one of the above categories.
18. `Subsystem:` Originator inputs particular subsystem affected by placing cursor in input field and pressing enter to see the following choices:
    EOSDIS Version 0
    EOSDIS Version 1
    EOSDIS Version 2
    EOSDIS Version 3
    EOSDIS Version 4
    ECS FOS
    ECS SDPS
    ECS CSMS
    New Keywords
    Additional choices will be available in the future and may be entered by choosing "New Keywords".
19. `Problem Category:` Originator inputs appropriate problem category from the following choices:
    `Process` - problem lies in a system development process.
    `Review` - problem lies in a review process.
    `Document` - documentation does not meet requirements.
    `Software` - software does not meet requirements.
    `Hardware` - hardware does not meet requirements.
    `Other` - to be used for problems that do not fit under one of the above categories and should be explained in the "Comments" section at the bottom of the form.
20. `Lifecycle Phase:` Originator inputs appropriate lifecycle phase the system being reviewed is in from the following choices:
    `Requirement` - system software requirements being developed.
    `Design` - system being designed.
    `Implementation` - design being implemented.
    `Test` - system being tested.
    `Operations/Maintenance` - system has been fielded.
21. `Release:` Originator inputs particular release by placing cursor in input field and pressing enter to see the following choices:
    ECS IR-1
    ECS Release A
    ECS Release B

ECS Release C
ECS Release D
EDOS Build 1
EDOS Build 2
EDOS Build 3
ECOM Release 1
ECOM Release 2
ECOM Release 3
New Keywords
Additional choices will be available in the future and may be entered by choosing "New Keywords".

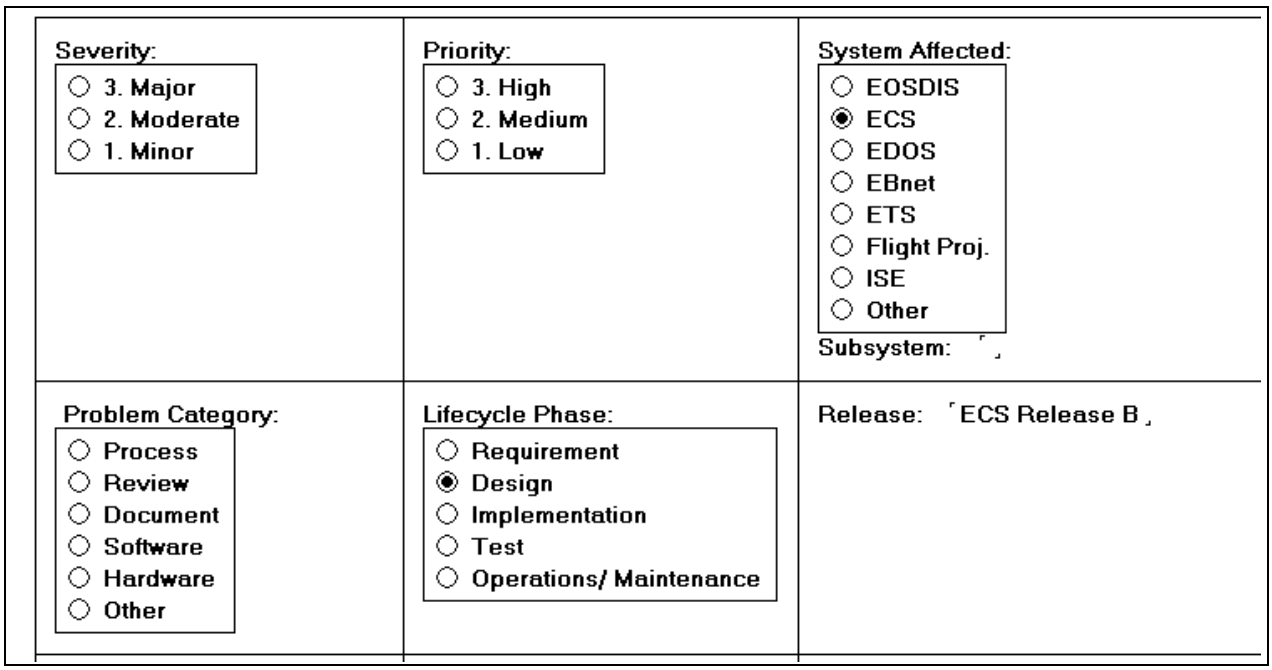

Exhibit 4.2.2-7 Fields "15-21" of EOSDIS RID Form.

22. `Review Type:` If "Review" was selected under "Problem Category", the originator chooses the particular review type from the following choices:
    SRR/RIR - System Requirements Review/Requirements Interim Review
    SDR - System Design Review
    PDR/IDR - Preliminary Design Review/Interim Design Review
    CDR - Critical Design Review
    RRR - Release Readiness Review
    TRR - Test Results Review
    Other
23. `Status:` The present status of the RID is made from the following choices:
    `Draft` - automatically generated when the form is opened.
    `Ready for Review` originator selects when the RID is ready for review.
    `Rejected` - reviewer selects when the RID is not acceptable for submission to NASA.

`Rejected for Rework` reviewer places RID in this state and notifies author to rework RID

`Approved` - reviewer selects when the RID is ready for submission to NASA.

`Submitted` - automatically updated when the RID is E-mailed to NASA.

`Opened by NASA` - reviewer selects when NASA opens the RID for consideration.

`Closed by NASA` - reviewer selects when NASA considers the RID closed.

`Unresolved` - reviewer selects when it is believed that incomplete or inappropriate action has been taken.

`Resolved` - reviewer selects when it is agreed with NASA that the RID has been resolved.

24. `Dates:` The following dates coincide with the Status choices above and will be entered automatically when the RID is saved (the Draft date is shown when the form is opened).
    Draft Date
    Ready for Review Date
    Rejected for Rework Date
    Rejected Date
    Approved Date
    Submitted Date
    Opened by NASA Date
    Closed by NASA Date
    Resolved Date
    Unresolved Date
25. `Subject:` Originator enters a brief statement of the subject of the RID.
26. `Description of Problem or Suggestion:` Originator enters a description of the problem.
27. `Originator's Recommendation:` Originator enters a recommendation to solve the problem.
28. `Predecessor Reference Number:` When a RID is reissued this field requires the originator reference number from the previous submission to be noted here.
29. `Successor Reference Number:` When a RID is reissued this field requires the originator reference number of the new submission be noted here.
30. `Comments:` Place pertinent information not contained in other fields here.
31. `Contractor Response:` Any response received from the contractor concerning this problem.
32. `NASA Response:` Any response received from NASA concerning this problem.

`BUTTONS:`

1. `Just Save and Close Window:` Click on this button to save and close RID.
2. `Save and Prepare RID:` Only those with reviewer status can make this choice. Click on this button, after the RID has been approved, to prepare it in the proper format to be E-mailed.

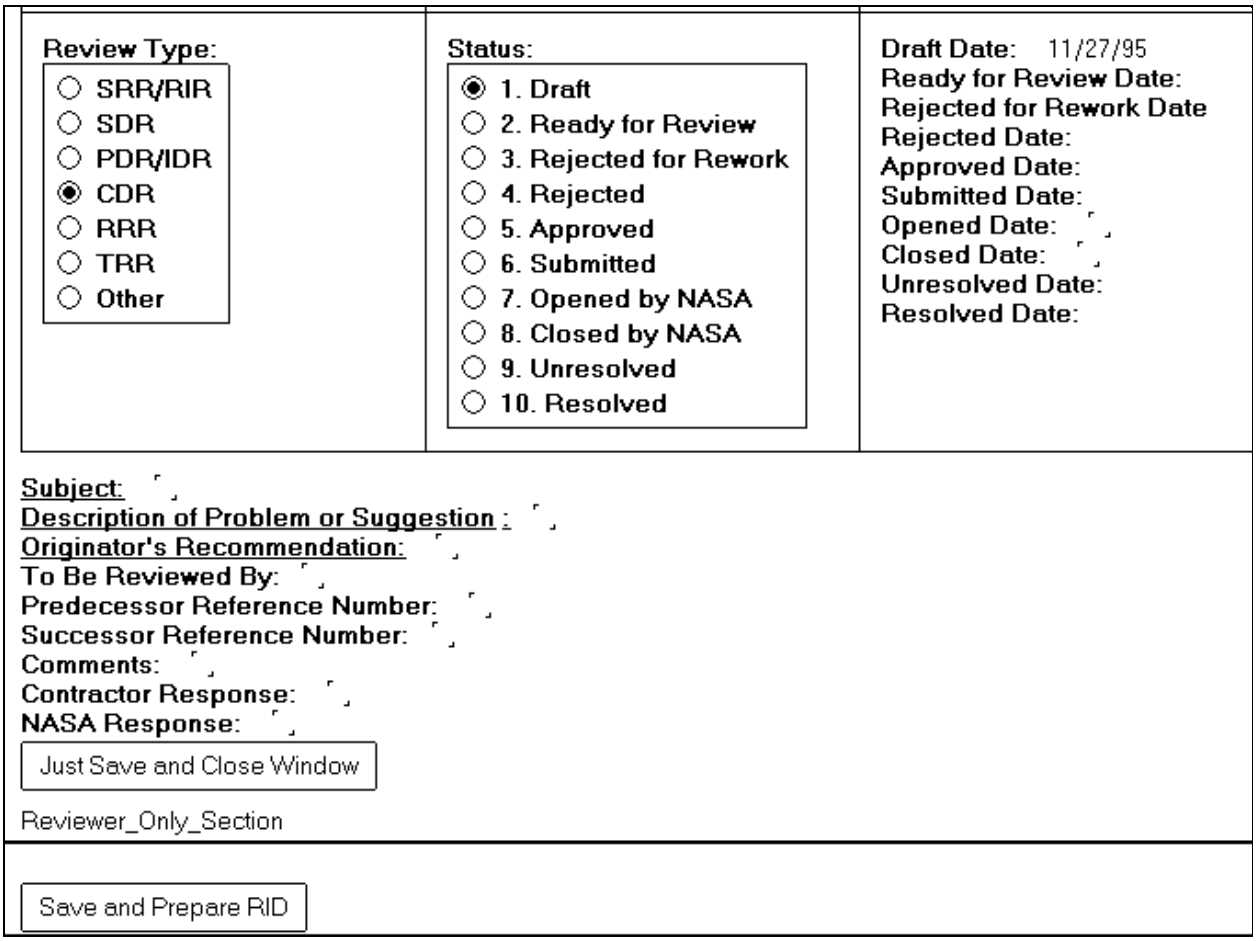

Exhibit 4.2.2-8 Fields "22-32" and Buttons "1-2" of EOSDIS RID Form.

To Prepare a RID for E-mailing:

After the RID submission form is approved, the reviewer clicks on the "Save and Prepare RID" button located at the bottom of the document (can only be done by a reviewer). This generates a text document with the mandated format ready to be E-mailed. Upon creation it will be displayed on the screen for review. When closed it is automatically saved to the data base and can only be viewed and mailed by a reviewer.

To E-mail a single RID or group of RIDs:

After the text formatted RID documents have been created, a reviewer may select the appropriate RIDs in the "All RIDs Ready to Be Mailed" view by clicking on the left border of the view. Checkmarks will appear next to the RIDs selected. The "All RIDs Ready to be Mailed" view can only be accessed by reviewers and displays all RIDs that have been prepared for E-mailing to NASA. The selected RIDs are then mailed by selecting the "Rid Mail" Icon created under the "Initial Startup" section. A mail form then comes up and the following must be entered:

. For "Mail Location" enter "m:\ccdata".

- For “User Name” enter your first and last name in small case with a single space between them.
- For “Password” enter your mail password.

After all entries have been made, select “OK ”. On the “cc:Mail Simple Message Interface” form select “Address”. Choose “Internet” and then enter the following address:

ecsrids@ulabsgi.gsfc.nasa.gov

Select “Done ” and then “Send ” to complete the process.

4.2.2.3 IDHS Issue Submission Form

To Prepare an Issue:

After opening the database, choose “Compose - 2. Issue Submission Form” from the menu. The information in the top-most six fields is automatically generated from information contained in the Address Book database. All remaining fields are to be filled in by the originator. Fields that must have inputs are underlined. Help for individual fields may be displayed by clicking on the field title. When the form is completed, select “File - Save” from the menu.

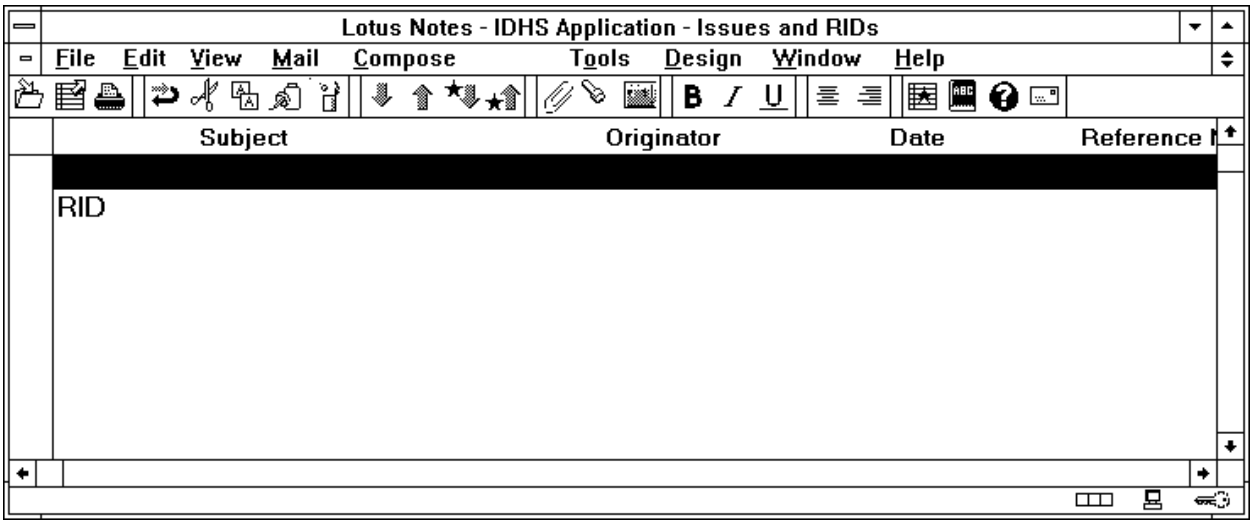

Exhibit 4.2.2-9 IDHS application view of Lotus Notes.

FIELDS:

1. Originator: Writer of Issue. This field is automatically generated when the form is first opened in first name last name format.
2. Submission Date: Date Issue was first entered into the system. This field is automatically generated when the form is first opened but may be edited.
3. Organization: Originator’s organization. This field is automatically generated when the form is first opened.

4. `E-Mail Address:` The E-mail address of the originator. This field is automatically generated when the form is first opened.
5. `Phone Number:` Phone number of originator. This field is automatically generated when the form is first opened.
6. `Task Number:` Task number of the originator. This field is automatically generated when the form is first generated.

EOSDIS Issue Form

Originator:	Submission Date:
Organization:	E-Mail Address:
Phone Number:	Task Number:

Exhibit 4.2.2-10 Fields "1-6" of EOSDIS Issue Form.

7. `Priority:` Originator assigns a priority of Low, Medium or High according to how quickly action must be taken (in originator's opinion).
8. `Problem Category:` Originator inputs appropriate problem category from the following choices:
   `Process` - problem lies in a system development/manufacturing process.
   `Review` - problem lies in a review process.
   `Document` - documentation not meeting requirements.
   `Software` - software not meeting requirements.
   `Hardware` - hardware not meeting requirements.
   `Other` - to be used for problems that do not fit under one of the above categories.
9. `System Affected:` Originator inputs the systems affected from the following choices:
   `EOSDIS` - refers to system wide.
   `ECS` - refers to the EOSDIS Core System developed by HAIS.
   `EDOS` - refers to the EOS Data and Operations System developed by TRW.
   `EBnet` - refers to the EOS Communication System developed by CSC.
   `ETS` - refers to the EOS Test System.
   `Flight Proj.` refers to the Flight Project portion of EOS.
   `ISE` - refers to the Integrated Support Environment of the IV&V team.
   `Other` - to be used for discrepancies that do not fit under one of the above categories.
10. `Severity:` Originator assigns a severity of Minor, Moderate or Major according to the harshness of the problem (in originator's opinion).
11. `Release:` Originator inputs particular release by placing cursor in input field and pressing enter to see the following choices:
    ECS IR-1
    ECS Release A
    ECS Release B
    ECS Release C

ECS Release D
EDOS Build 1
EDOS Build 2
EDOS Build 3
ECOM Release 1
ECOM Release 2
ECOM Release 3
New Keywords

12. `Lifecycle Phase:` Originator inputs appropriate lifecycle phase the system is in from the following choices:

    `Requirement` - system software requirements being developed.
    `Design` - system being designed.
    `Implementation` - design being implemented.
    `Test` - system being tested.

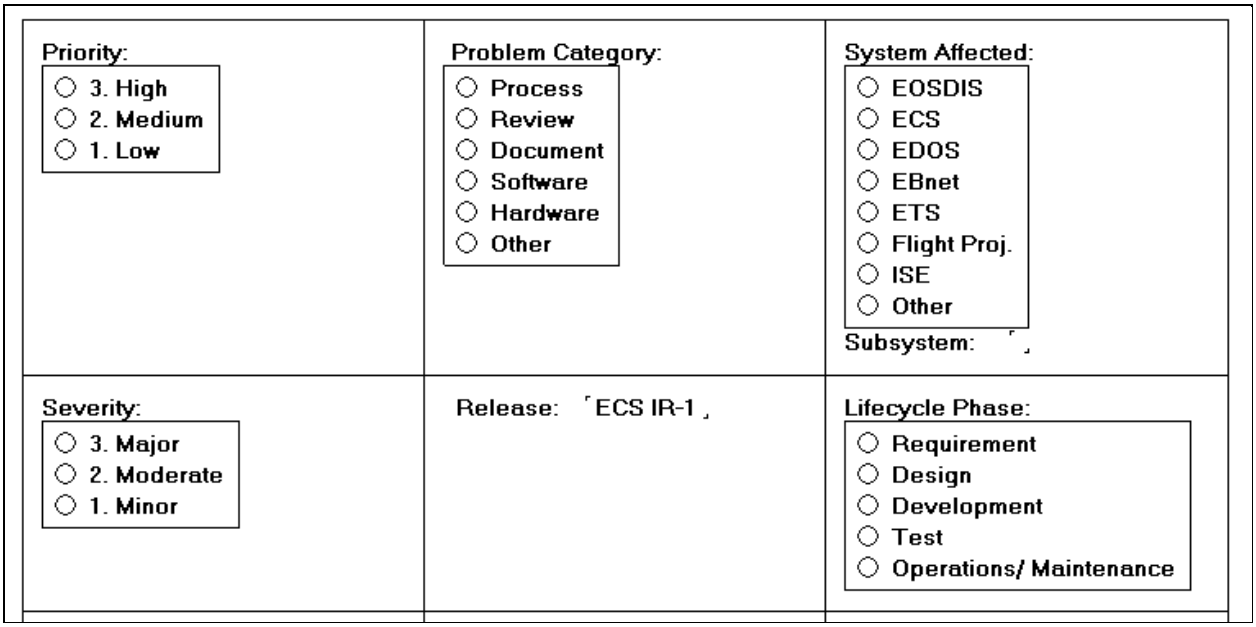

Exhibit 4.2.2-11 Fields "7-12" of EOSDIS Issue Form.

13. `Issue Type:` If the Issue is internal to the IV&V team, and will not be submitted to NASA, then internal is chosen. If it is to be submitted to NASA at a monthly findings meeting, then external is chosen.

    `Internal`
    `External`

14. `Status:` The present status of the Issue is chosen from the following:
    `Draft` - automatically generated when the form is opened.
    `Ready for Review` originator selects when the Issue is ready for review.
    `Rejected` - reviewers select when the Issue is rejected.
    `Approved` - reviewers select when they decide that the discrepancy is an issue that needs resolved.

Submitted - if the Issue is approved, and is internal, the "Submitted" status will be skipped. If it is an external issue, the Issue will be submitted to NASA per a monthly findings meeting and the reviewers will change its status to "Submitted".

Unresolved - reviewer selects when it is not agreed that the Issue has been resolved.

Resolved - reviewer selects when it is agreed that the Issue has been resolved.

15. Dates: The following dates coincide with the "Status" choices above and will be entered automatically when the Issue is saved (the Draft Date is shown when the form is opened).
    Draft Date
    Ready for Review Date
    Rejected Date
    Approved Date
    Submitted Date
    Unresolved Date
    Resolved Date
16. Originator's Reference Number: Issue ID number from IV&V contractor. Automatically generated when the form is first opened.
17. Subject: Originator enters a brief statement of the subject of the Issue.
18. Description of Issue or Suggestion: Originator enters a description of the issue.
19. Originator's Recommendation: Originator enters a recommendation to solve the problem.
20. Predecessor Reference Number: When an Issue is resubmitted this field requires the originator reference number from the previous submission to be noted here.
21. Successor Reference Number: When an Issue is resubmitted this field requires the originator reference number from the new submission be noted here.
22. Comments: Place pertinent information not contained in other fields here.
23. NASA Response: Any response received from NASA concerning this Issue.

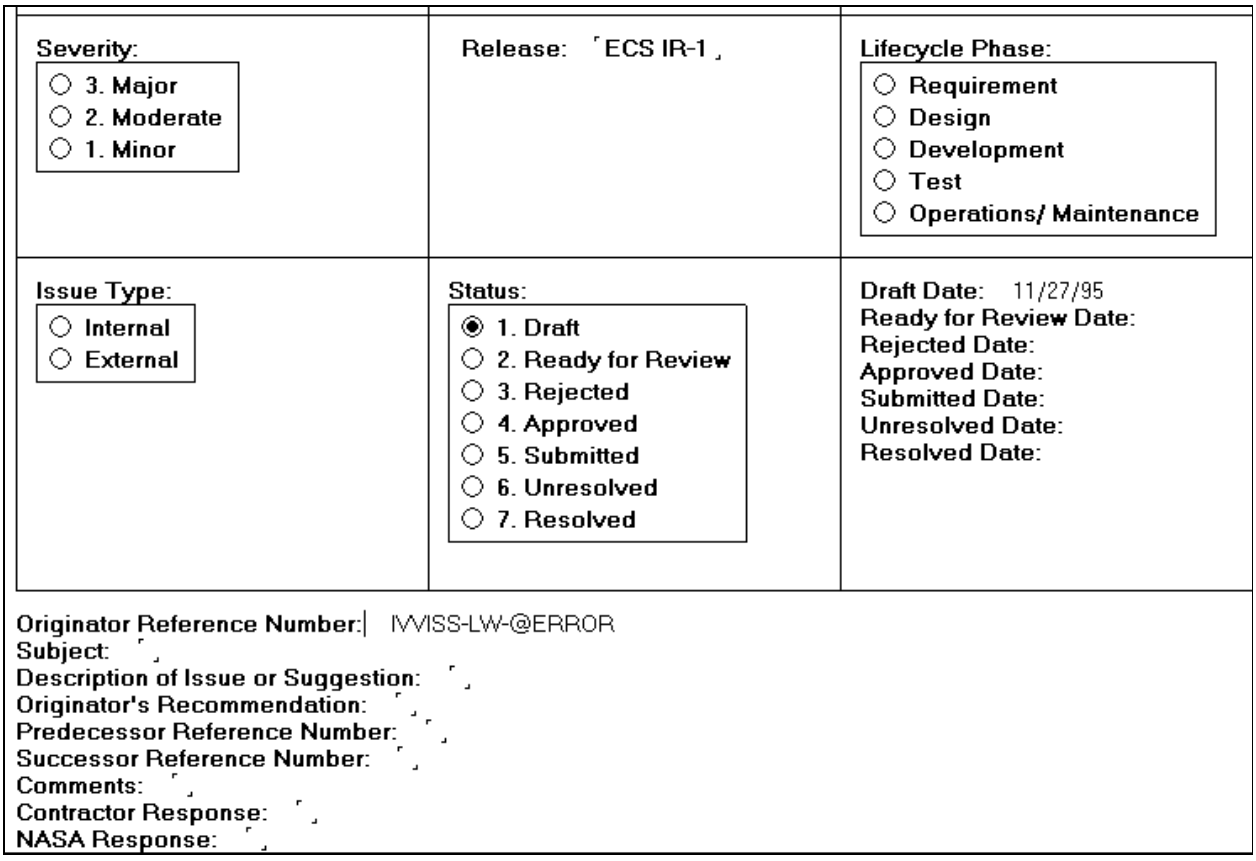

Exhibit 4.2.2-12 Fields "13-23" of EOSDIS Issue Form.

4.2.3 IDHS Messages

4.2.3.1 Informational Messages

All fields on the RID form and the Issue form display informational messages by clicking on the input title of each field. This action produces a dialog box with a help message that supplies some guidance on entries to the associated field..

4.2.3.2 Warning Messages

`The fieldname field requires an entry`

All required fields on the RID form and the Issue form will a display this message if an attempt is made to save the form to the database without making an entry where `fieldname` is the name of the empty field. All required fields are underlined.

`Document in statename state can only be moved to another state by those with Reviewer access level.`

Any change of status that is attempted without the correct access level will result in this message when the form is saved. Where `statename` represents the state of the form when the error occurs.

`Document in statename1 can only be moved to statename2.`
Any change of status that results in an improper status change will result in this message when the form is saved. Where `statename` represents the states captured by the Status field.

4.2.3.3 Error Messages

4.3 Interface Analysis Database (IADB) Design

The Interface Analysis Database (IADB) facilitates the capture and analysis of potentially conflicting interface specifications derived from multiple sources. The basic approach is to manage a hierarchy of document, interface, and data item definitions and specifications, which are manually extracted from source documents and entered into the database. Analysts use predefined queries and formats in the IADB to generate reports documenting the completeness and consistency of the specifications, both within and between documents. The IADB supports concurrent entry and analysis of interface specifications by multiple users. All document titles, component/element/system names, organization names, and data item class names are stored in tables and can be created, edited and deleted through the IADB user interface.

Interface analysis is supported at both the interface requirements document (IRD) and interface control document (ICD) levels. At the IRD level, IRDs are analyzed for internal consistency and completeness, as well as for consistency with other comparably detailed documents. To support internal consistency analysis, each IRD is divided into three subsections: requirements, interface chart (i.e., table), and interface diagram. Separate interface and data item specifications are maintained for each subsection of each IRD. For the purpose of analyzing consistency between IRDs, and between IRDs and other documents, the requirements subsection is used as the baseline specification. The IADB enables analysts to electronically import and link IRD requirements to the data item specifications to which each requirement pertains, assuring the accuracy of the data item specifications with respect to the source requirements. To manage inconsistent names for data items between source documents, analysts specify alias, sub-item and subclass relationships between names using an integrated data dictionary.

To support end-to-end consistency and completeness analysis at the IRD level, the IADB supports the association of component/element/system input-to-output data flows via intermediate, analyst-defined functions. This is accomplished via the following steps:

1. The analyst electronically imports the IRD requirements.
2. The analyst associates the imported requirements with the corresponding source document title and version.
3. For each source document, the analyst associates each requirement with the component(s)/element(s)/system(s) to which the requirement applies.
4. For each component/element/system, the analyst defines the functions provided and associates each requirement with one or more functions.
5. For each component/element/system and function, the analyst associates input and output data flows.

Once the input-to-output relationships are established, they are used to generate end-to-end data communications, processing and storage flows. This supports verification of the logical consistency and completeness of the interface specifications on an end-to-end basis.
At the ICD level, the IADB supports the following types of consistency and completeness analyses:

- Consistency of each ICD with the parent IRD(s)
- Internal consistency of each ICD
- Internal completeness of each ICD

The precise methodology and IADB user interface design for ICD-level analysis is TBD. As we define our detailed approach, we will update this document accordingly.

4.3.1 IADB Installation and Startup

4.3.2 IADB GUI Design

Exhibit 4.3.2-1 depicts the hierarchy of major windows and dialogue boxes for the IADB.

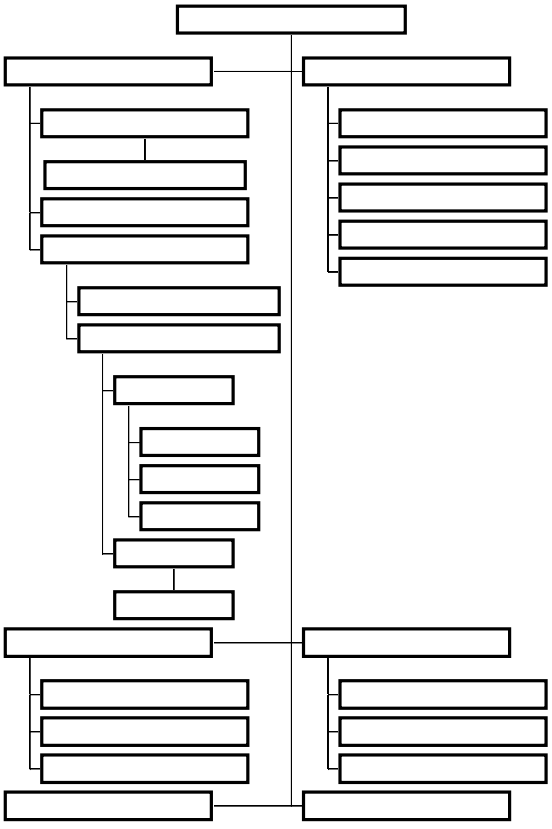

Exhibit 4.3.2-1 IADB User Interface Hierarchy

The following subsections detail the major windows and dialogue boxes of the IADB user interface.

4.3.2.1 IADB Executive Interface Screen

The Executive Interface Screen opens automatically when the IADB application is launched. The Executive Interface provides the user with the top-level choices within the IADB, including the following:

- Create, browse and edit interface specifications, including document definitions, interfaces, data item specifications, and links to requirements
- Generate any of a variety of consistency and completeness reports
- Create, browse and edit data item class definitions and interrelationships
- Associate requirements with source documents
- Create, browse and edit component/element/system definitions
- Create, browse and edit organization definitions

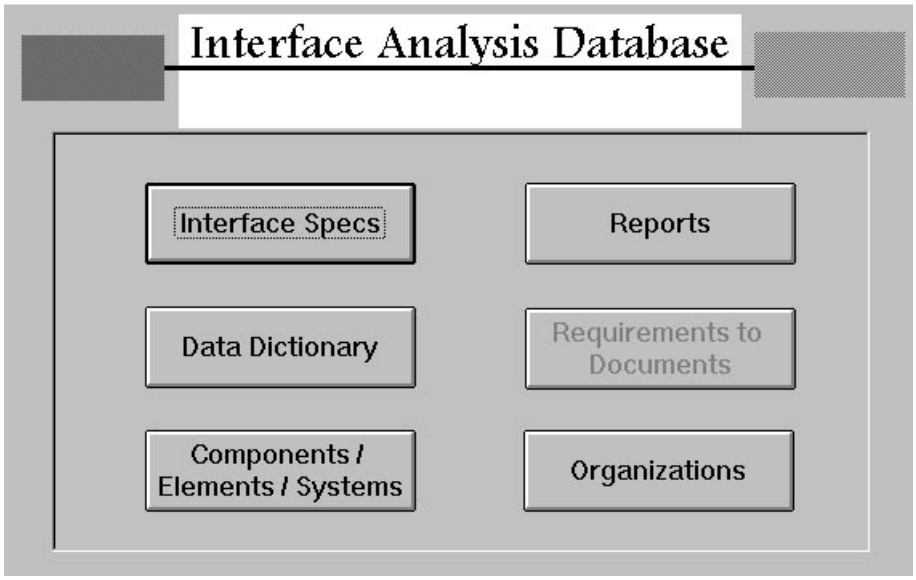

Exhibit 4.3.2-2 IADB Executive Interface Screen

BUTTONS:

Button	Action
Interface Specs	Opens Document screen
Reports	Opens Generate report screen
Data Dictionary	Opens Data Dictionary (Data Item Class) screen
Requirements to Documents	Opens Unassigned Requirements screen (enabled only when Requirements table contains unassigned requirements)
Components / Elements / Systems	Opens Component/Element/System screen
Organizations	Opens Organization screen

4.3.2.2 IADB Documents Screen

The Documents Screen enables creation, browsing and editing of document definitions, browsing and deletion of associated interfaces, and opening of the Requirements to Systems, Organizations, and Interface screens.

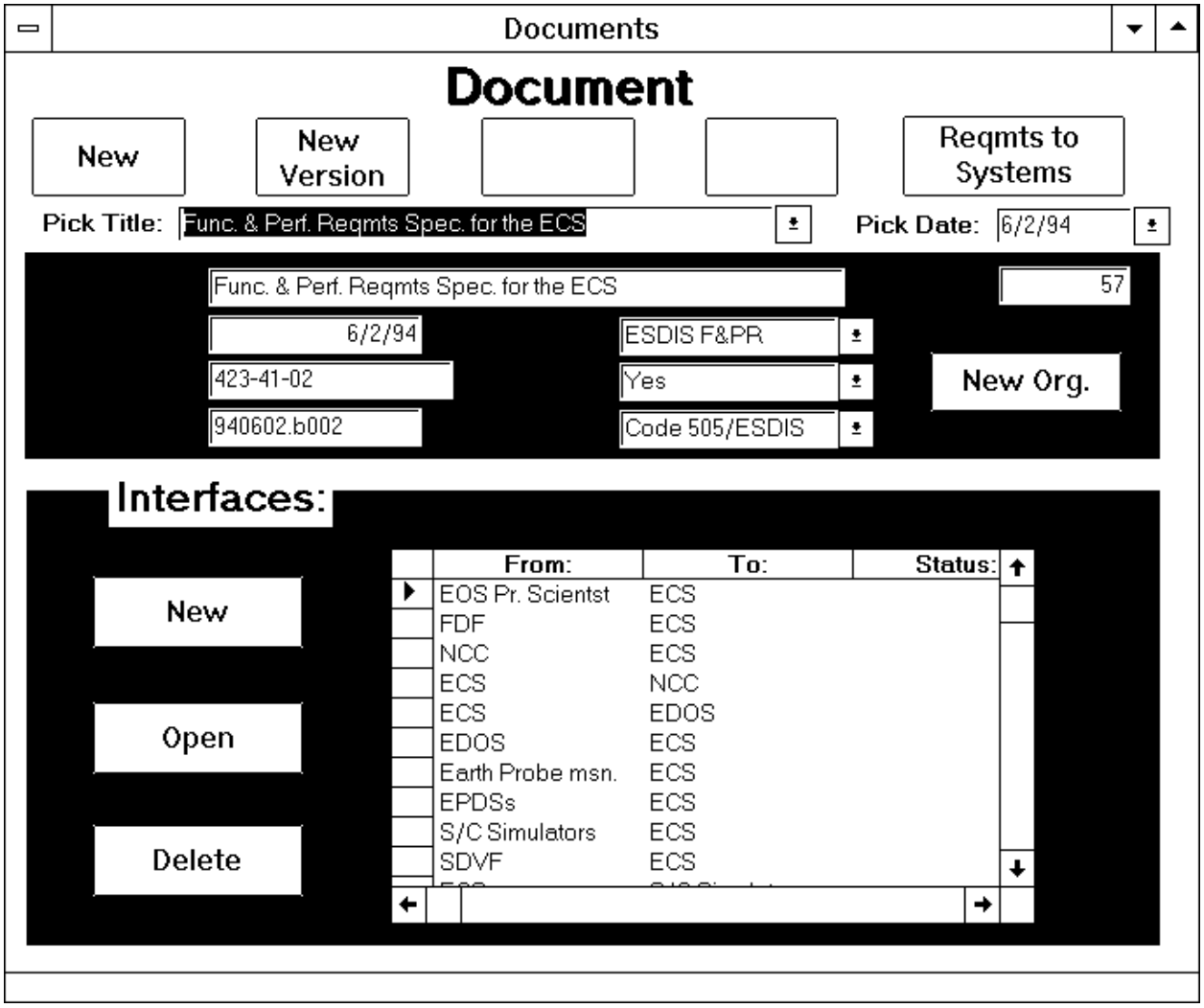

Exhibit 4.3.2-3 IADB Document Screen

FIELDS:

Field	Data Type	Source

Status	text	selected document status
[illegible]	text	selected document [illegible] number
[illegible]	display text (organization name) stores integer (organization ID)	organization linked to selected document
From	text	component element system ID/name
To	text	component element system ID/name
Status	text	TBD

BUTTONS:

New [Document]	Opens a document screen for a new document definition
New Version	Opens a document selection screen to enable generation of a copy of its database contents as a point of departure for a entering a new version
Save	Saves the current contents of the screen
Reset	Undoes unsaved changes to the screen
Requirements	Opens requirements screen to display requirements associated with current document
New Org.	Opens Organization screen to enable entry of a new organization definition
New [Interface]	Opens interface screen for entry of a new interface definition
Open	Opens interface screen to selected interface
Delete	Deletes selected interface definition and associated data items

4.3.2.3 IADB Organization Screen

The Organization Screen enables the creation, browsing and editing of organization definitions.

Exhibit 4.3.2-4 IADB Organization Screen

FIELDS:

Field	Data Type	Source
Organization Name	Text	Organization name
Organization ID	Integer	Organization ID

BUTTONS:

Button	Action
New	Clears screen for new organization definition
Save	Saves the current contents of the screen
Reset	Undoes unsaved changes to the screen

4.3.2.4 IADB Unassigned Requirements Screen

The Unassigned Requirements Screen is used to associate imported requirements with the appropriate source document. The approach is to import one set of requirements at a time into the Tempreq table, copy the requirements into the Requirements table, and then open the Unassigned Requirements screen from the Executive Interface and select the appropriate source document.

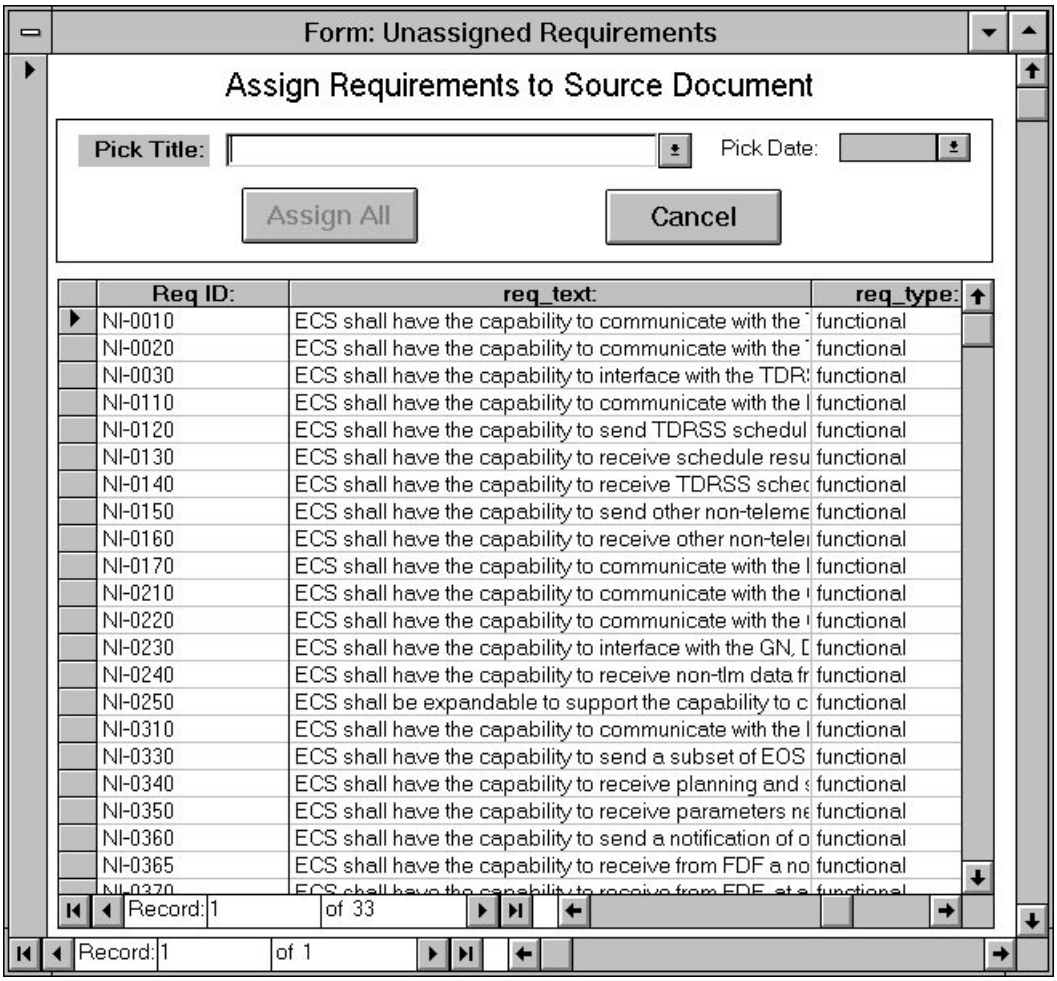

Exhibit 4.3.2-5 IADB Unassigned Requirements Screen

FIELDS:

Pick Title	Text	Document titles
Pick Date	Date/time	Document dates given the
req_date	text	programmable date for requirement
req_text	memo	requirement text
req_type	text	functional, performance, operational, interface

BUTTONS:

Button	Action
Assign All	Assigns requirements to selected document
Cancel	Closes the screen without assigning requirements to a document

4.3.2.5 IADB Requirements to Systems Screen

This screen enables the analyst to associate each requirement from a given document with the components, elements, and/or systems to which the requirement applies.

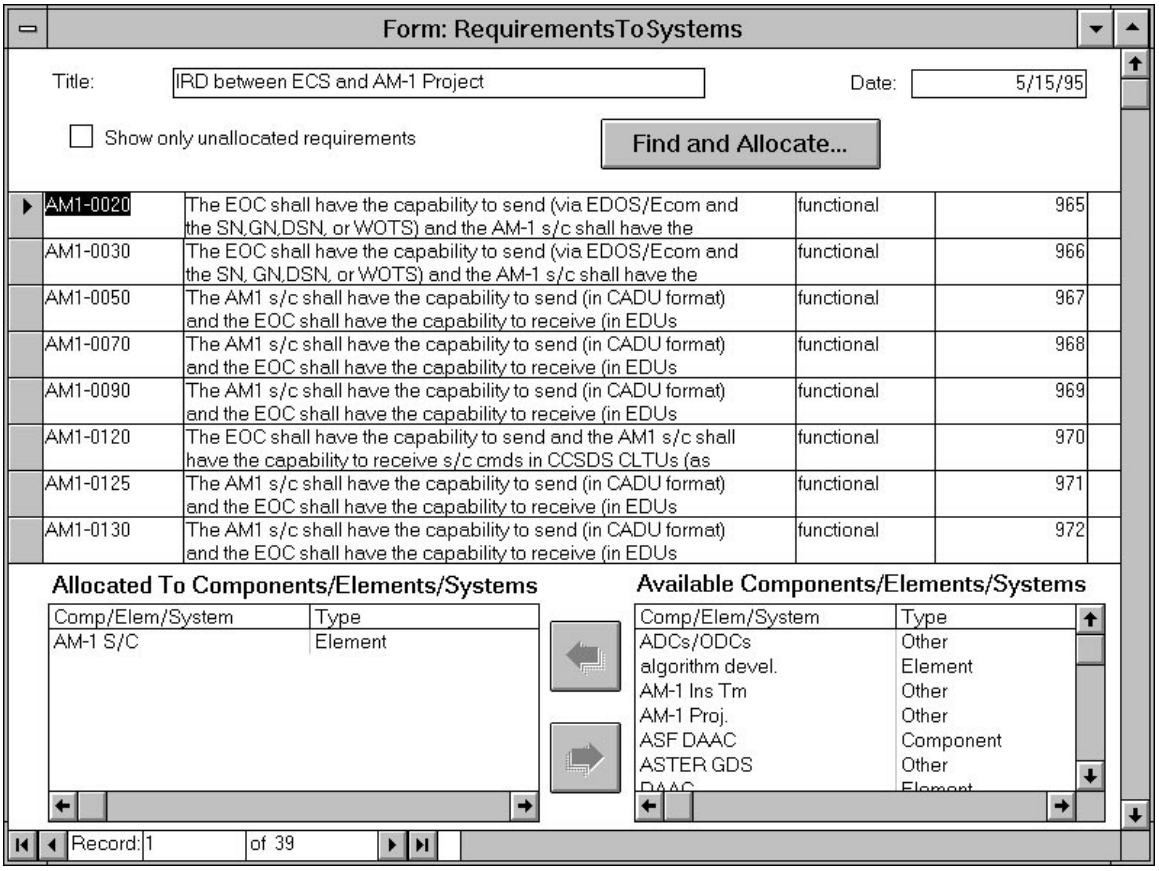

Exhibit 4.3.2-6 IADB Requirements to Systems Screen

FIELDS:

Field	Data Type	Source
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] requirement
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] functional, performance, operational, interface

Req_id	integer	internally assigned requirement ID
Allocated to Components/ Elements/ Systems	displays text stores integer	abbreviated names/types/IDs for components/ elements/ systems to which selected requirement has been allocated
Available Components/ Elements/ Systems	displays text stores integer	abbreviated names/types/IDs for components/ elements/ systems to which selected requirement has not been allocated

BUTTONS:

Find and Allocate...	Opens the Find and Allocate screen from which requirements containing specific strings can be assigned to a specified component, element or system
Allocate (Left) Arrow	Allocates the selected requirement to the component, element or system selected in the "Available" list
Deallocate (Right) Arrow	Deallocates the selected requirement from the component, element or system selected in the "Allocated To" list

4.3.2.6 IADB Interface Screen

The Interface Screen enables the creation and browsing of interfaces associated with a given document, the browsing and deletion of associated data items, the opening of the Component/Element/System and Data Item screens.

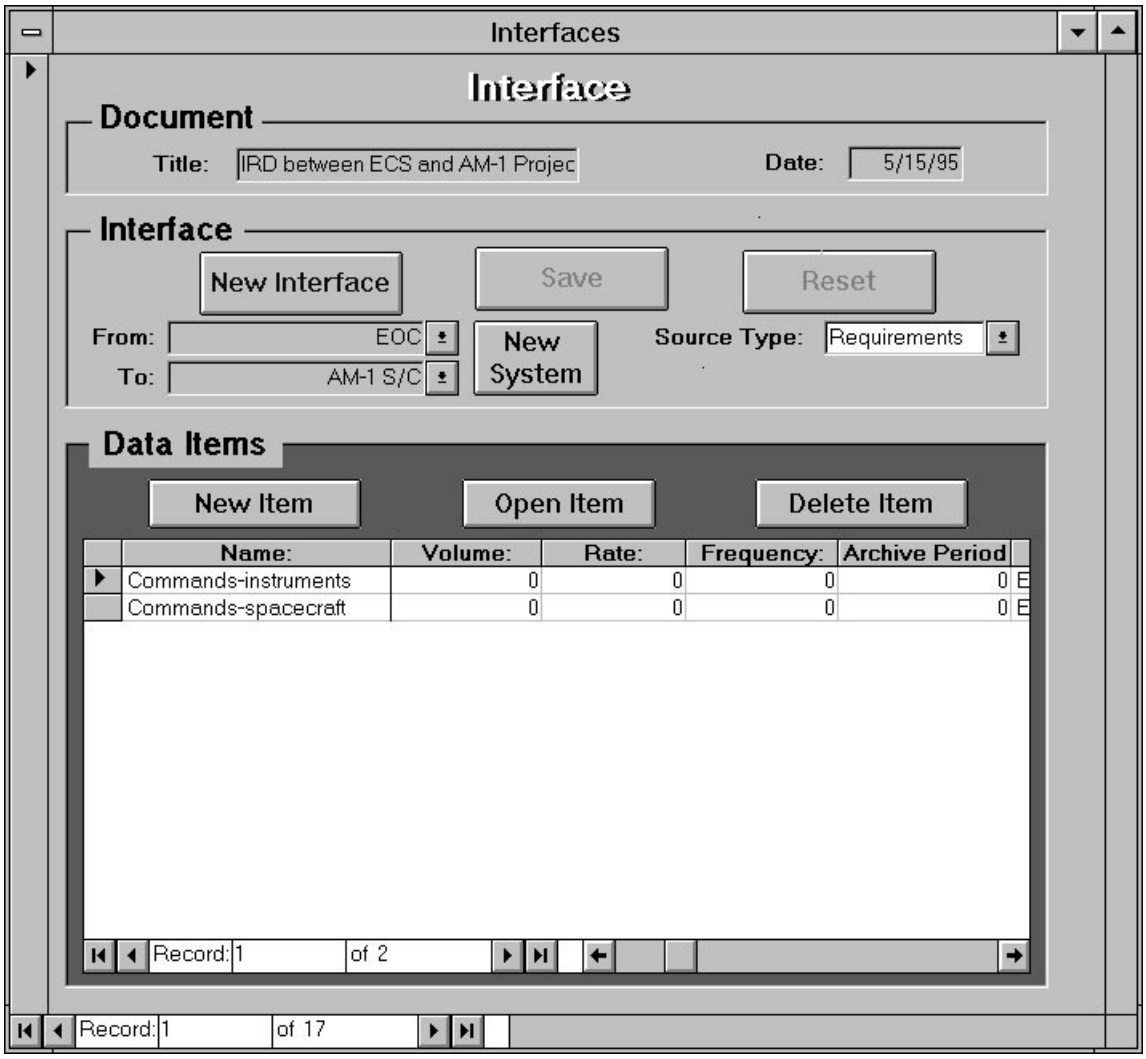

Exhibit 4.3.2-7 IADB Interface Screen

FIELDS:

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Rate Units	text	rate units
Frequency	number	data flow frequency
Frequency Units	text	frequency units
Archive Period	number	archive period
Archive Period Units	text	archive period units

BUTTONS:

New Interface	Clears screen for new interface definition
Save	Saves the current contents of the screen
Reset	Undoes unsaved changes to the screen

4.3.2.7 IADB Component/Element/System Screen

This screen enables (1) the creation, browsing and editing of component/element/system definitions, (2) creation, editing and deletion of sub-element relationships between components, elements and systems, and (3) the opening of the Organization screen and Function Inputs and Outputs screen.

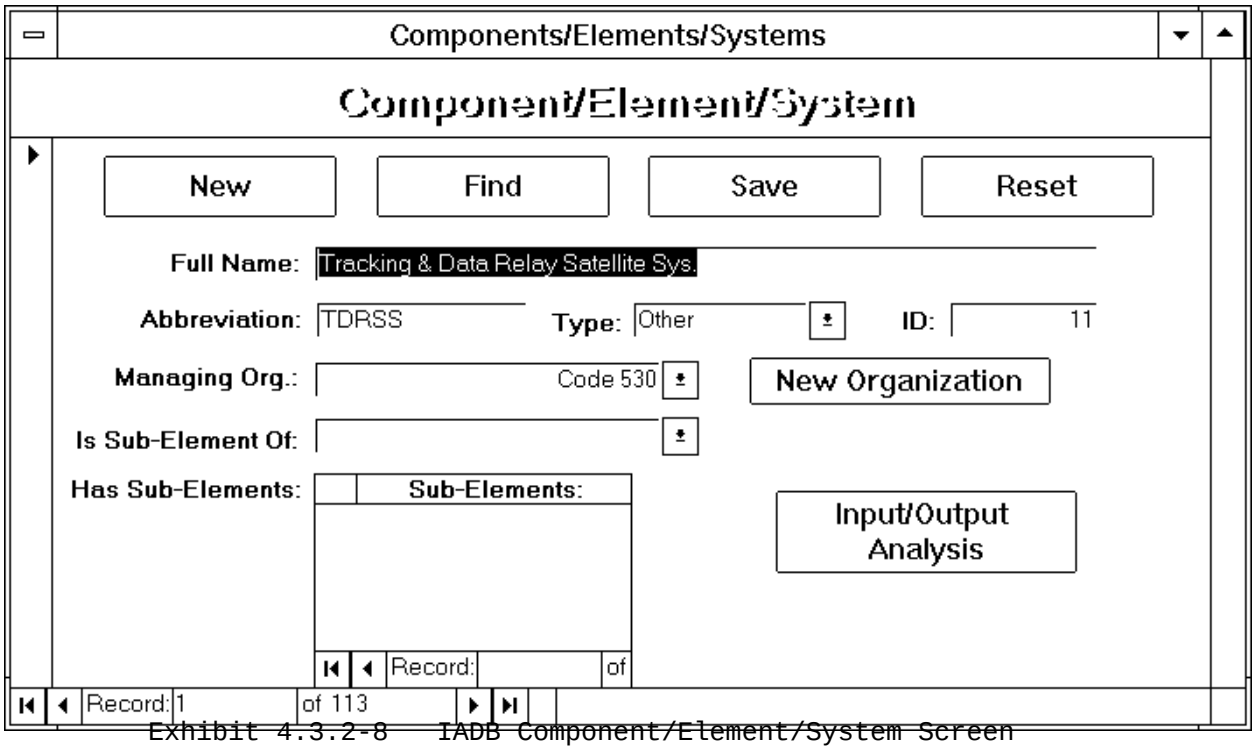

Exhibit 4.3.2-8 IADB Component/Element/System Screen

FIELDS:

Field	Data Type	Source
Full Name	text	component/element/system name
Abbreviation	text	component/element/system abbreviation
Type	text	component/element/system
ID	integer	component/element/system ID
Managing Org.	displays text stores integer	name/ID of the managing organization
Is Sub-element Of	displays text stores integer	name/ID of the parent component/element/system
Has Sub-elements	displays text stores integer	names/IDs of the subordinate components/elements/systems

BUTTONS:

Button	Action
New	Clears screen for new component/element/system definition
Find	Opens a subordinate dialogue box to find a specified component/element/system
Save	Saves the current contents of the screen
Reset	Undoes unsaved changes to the screen
New Organization	Opens the Organization screen for entry of a new organization definition
Input/Output Analysis	Opens the Functional Inputs and Outputs screen for the current component/element/system

4.3.2.8 IADB Requirements to Functions Screen

This screen is used to associate a given component/element/system's requirements with analyst-defined functions, which in turn provide the basis for logically relating input and output data flows.

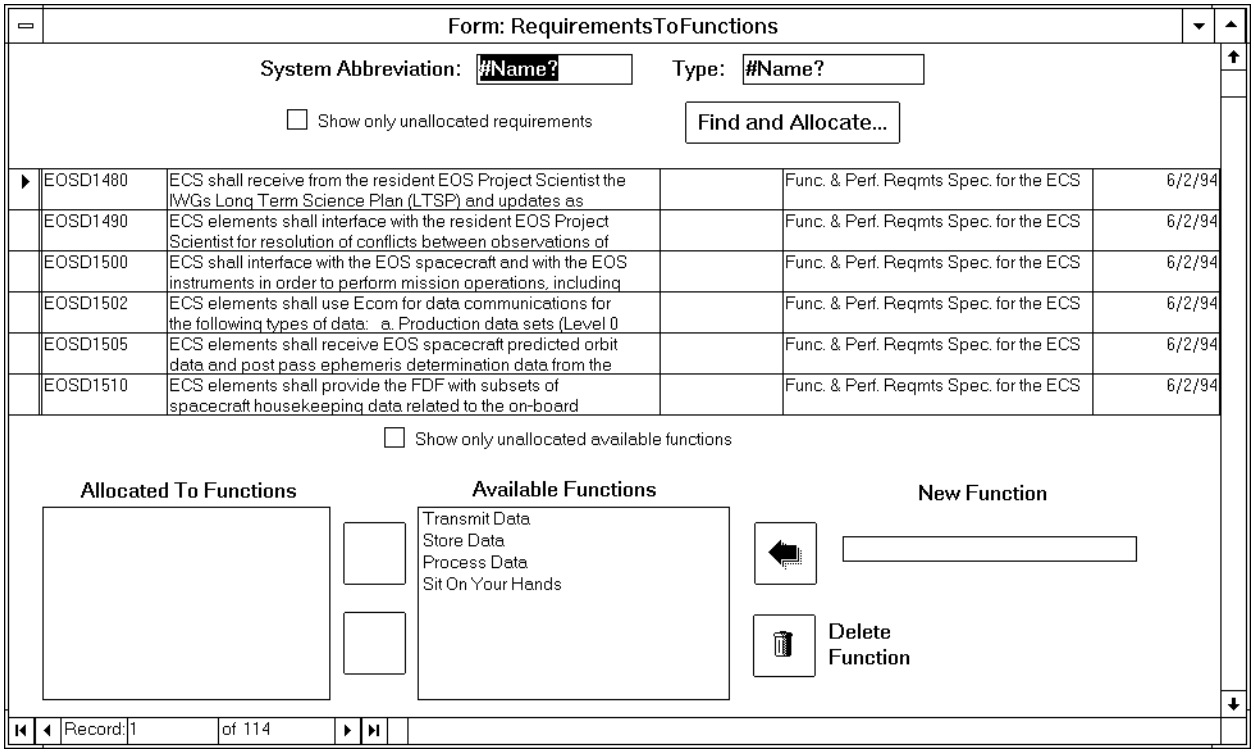

Exhibit 4.3.2-9 IADB Requirements to Functions Screen

FIELDS:

[illegible]	[illegible]	[illegible] abbreviation
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	current component element system and currently selected requirement
[illegible]	[illegible]	[illegible] current component element system but not with currently selected requirement
[illegible]	[illegible]	[illegible] to current component element system
[illegible]	[illegible]	[illegible] ID
[illegible]	[illegible]	[illegible]

Req_Type	[illegible]	[illegible] operational, interface

BUTTONS:

Button	Action
[illegible]	[illegible] specific strings can be assigned to a specified function
Allocate (Left) Arrow	Allocates the selected requirement to the function selected in the "Available" list
Deallocate (Right) Arrow	Deallocates the selected requirement from the function selected in the "Allocated To" list
Add Function (Left) Arrow	Associates a user-defined function with the current component/element/system, adding the function to the "Available" list
Delete Function (Trash Can)	Disassociates the function selected in the "Available" list from the current component/element/system and removes it from the "Available" list
Show Only Unallocated Requirements	When selected, displays only those requirements not already allocated to at least one function
Show Only Unallocated Functions	When selected, displays only those available functions not already allocated to at least one requirement

4.3.2.9 IADB Function Inputs and Outputs Screen

The Function Inputs and Outputs screen enables the analyst to associate input and output data flows with each function for a given component/element/system.

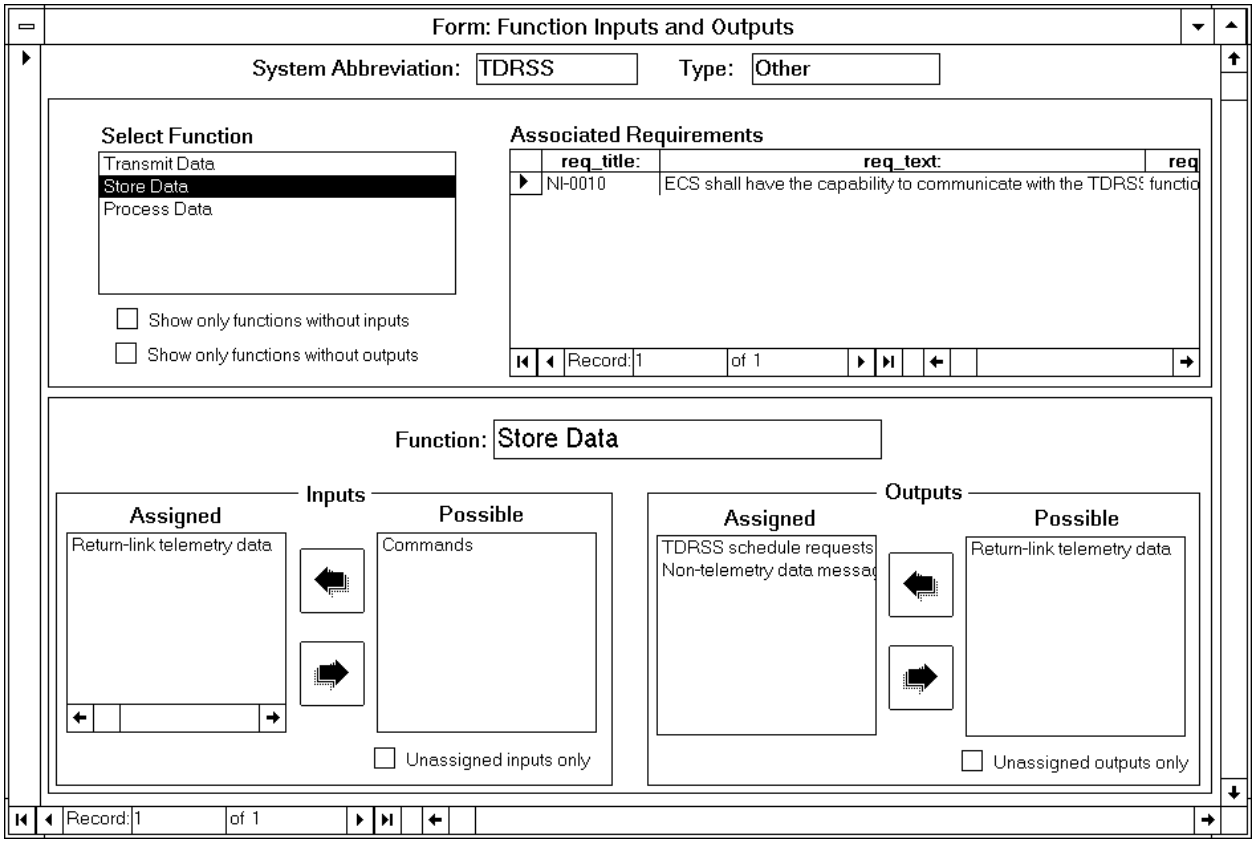

Exhibit 4.3.2-10 IADB Function Inputs and Outputs Screen

FIELDS:

Field	Data Type	Source
System Abbreviation	text	component, element of system abbreviation
Type	text	component, element of system
Select Function		
req_id	integer	internally assigned requirement ID
req_text	memo	requirement text
req_type	text	functional, performance, operational, interface
Function	text	displays selected function name from upper portion of window
Assigned Inputs	list of text	names of data item classes that have been assigned as inputs to selected function
Possible Inputs	list of text	names of data item classes that

		component/element/system and which have not been assigned as inputs to selected function
Assigned Outputs	list of text	names of data item classes that have been assigned as outputs to selected function
Possible Outputs	list of text	names of data item classes that that are outputs of current component/element/system and which have not been assigned as outputs of selected function

BUTTONS:

Button	Action
Show Only Functions Without Inputs	When selected, displays only those functions to which no inputs have been assigned
Show Only Functions Without Outputs	When selected, displays only those functions to which no outputs have been assigned
Assign Input (Left) Arrow	Assigns the selected possible input to the selected function
De-assign Input (Right) Arrow	De-assigns the selected assigned input from the selected function
Only Unassigned Inputs	When selected, displays only those possible inputs that are not assigned to any functions
Assign Output (Left) Arrow	Assigns the selected possible output to the selected function
De-assign Output (Right) Arrow	De-assigns the selected assigned output from the selected function
Only Unassigned Outputs	When selected, displays only those possible outputs that are not assigned to any functions

4.3.2.10 IADB Data Item Screen

The Data Item Screen enables the (1) creation, browsing and editing of data items for a given document and interface, (2) browsing and deletion of links to requirements, and (3) the opening of the Data Dictionary and Add [requirement] Links screens.

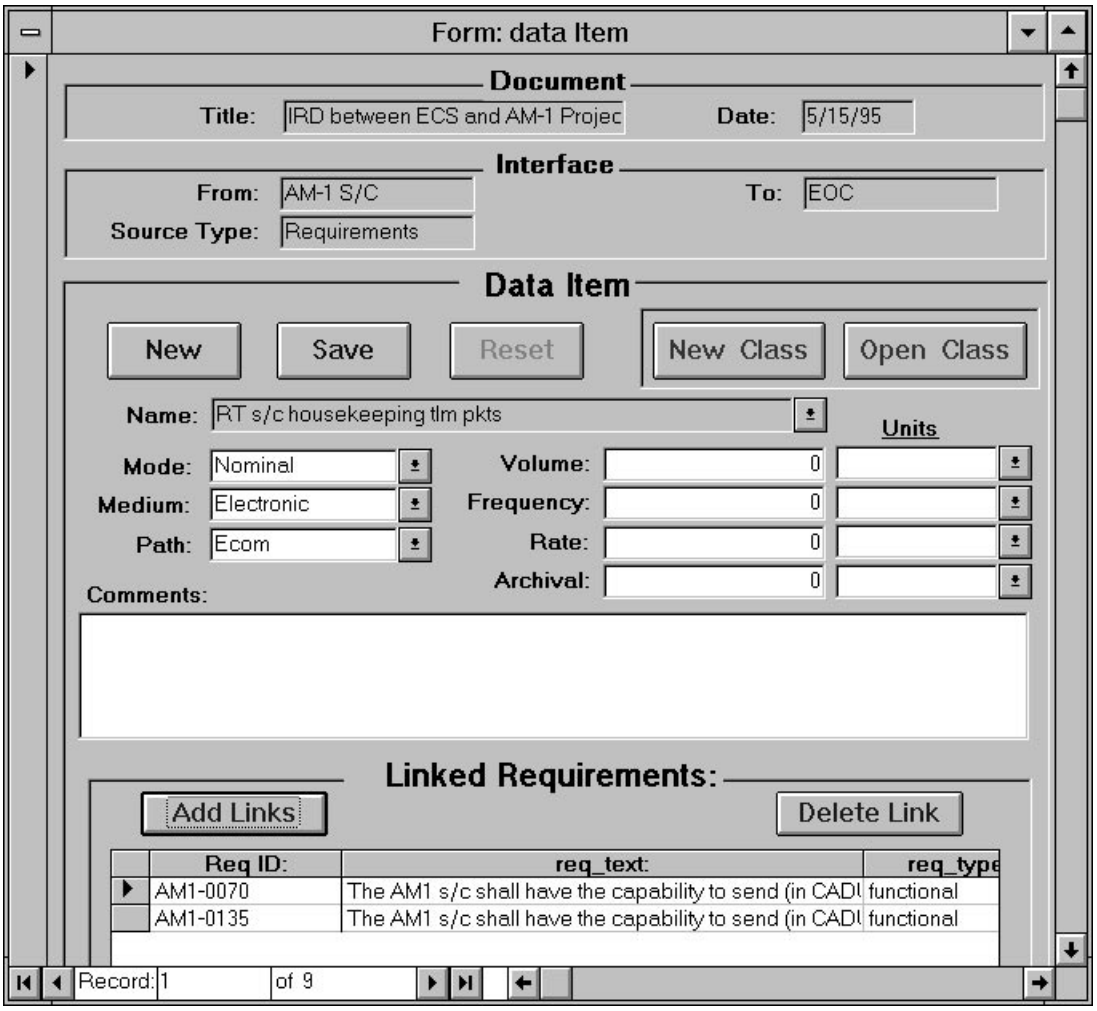

Exhibit 4.3.2-11 IADB Data Item Form Screen

FIELDS:

Field	Data Type	Source
Title	text	Document title
Date	date/time	Document date
From	text	component element/system ID/name
To	text	component element/system ID/name
Source Type	text	"Requirements", "Chart", or "Diagram"
Name [Data Item]	text	data item data name, only if undefined name automatically adds name to data dictionary
Units	text	specification units, e.g., psi

		operations...
[illegible]	text	communications medium, e.g., voice, paper, electronic...
[illegible]	text	electronic communications path, e.g., Econ, NOLAN...
[illegible]	number	data flow volume
Volume Units	text	volume units
[illegible]	number	data flow rate
[illegible]	text	rate units
[illegible]	number	data flow frequency
Frequency Units	text	frequency units
[illegible]	number	archive period
[illegible]	text	archive period units
[illegible]	memo	comments between analysts
Req_id	integer	internally assigned requirement ID
[illegible]	memo	requirement text
Req_type	text	functional, performance, operational, interface

BUTTONS:

[illegible]	[illegible]
New	Clears screen for new interface definition
Save	Saves the current contents of the screen
Undo	Undoes unsaved changes to the screen
New Class	Opens the Data Dictionary screen for entry of a new data item class
Open Class	Opens the Data Dictionary screen to the current data item class
[illegible]	Opens the Add Requirement Links screen for creation of new requirement links
Delete Link	Deletes the link between the current data item and the currently selected requirement

4.3.2.11 IADB Add Requirement Links Screen

This screen is opened from the Data Item screen to associate requirements from the current source document with the current data item specification. Find and Find Next buttons support the analyst in identifying potentially applicable requirements.

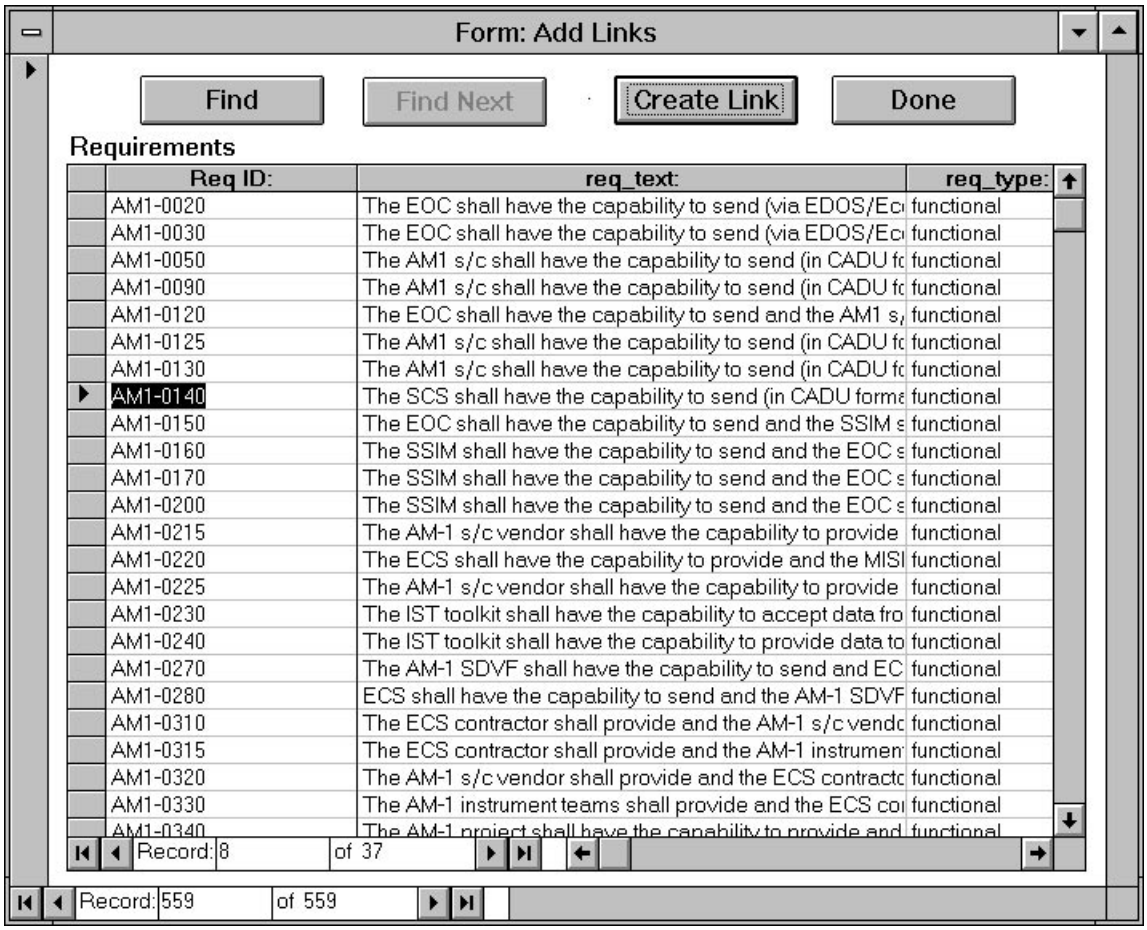

Exhibit 4.3.2-12 IADB Add Requirement Links Screen

FIELDS:

Field	Data Type	Source
req_id	integer	internally assigned requirement ID
req_text	memo	requirement text
req_type	text	functional, performance, operational, interface

BUTTONS:

Button	Action
Find	Opens subordinate screen for specifying a character string to search for and a requirement field to search in
Find Next	Finds the next occurrence of the specified string in the specified field
Create Link	Links the currently selected requirement to the current data item specification
Done	Closes the Add Requirement Links screen

4.3.2.12 IADB Data Dictionary Screen

The Data Dictionary (Data Item Class) screen enables analysts to create, browse and edit data item class definitions, including the creation and deletion of alias, sub-item and subclass relationships between classes.

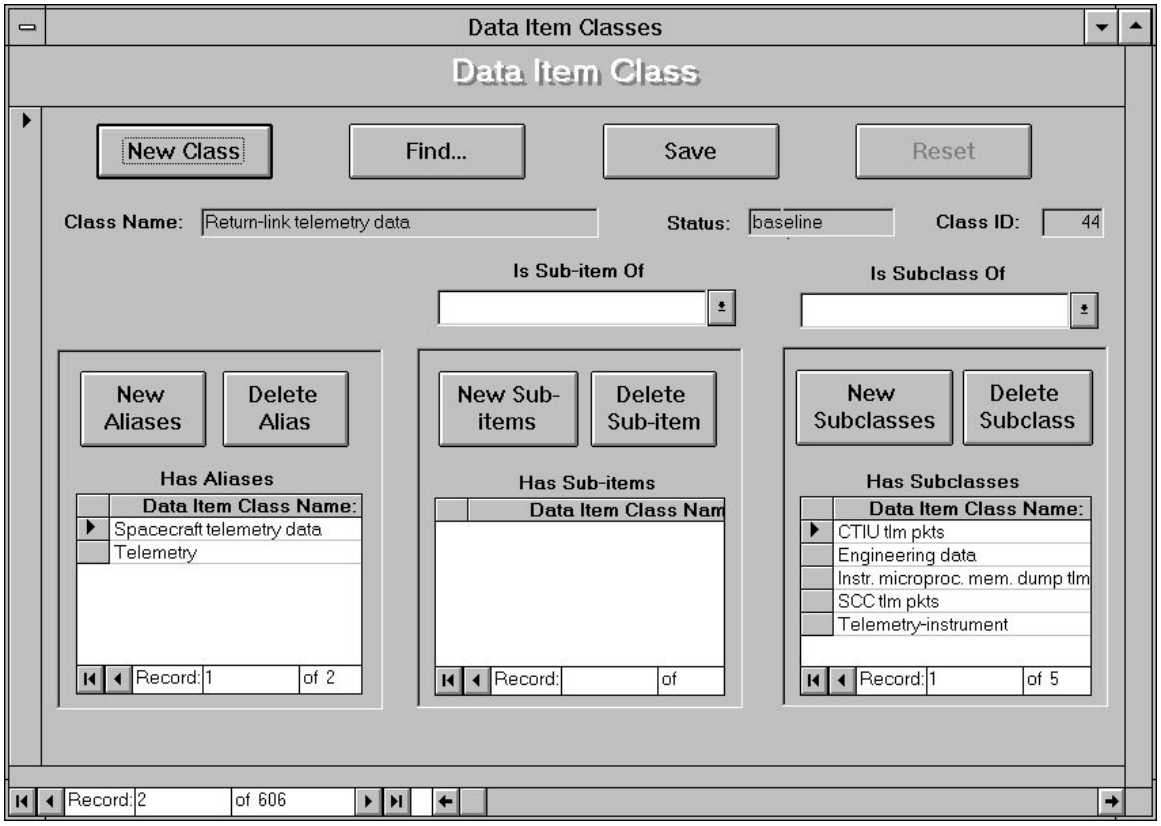

Exhibit 4.3.2-13 IADB Data Dictionary Screen

FIELDS:

Field	Data Type	Source
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	baseline, alias of IADB
[illegible]	integer	internally assigned data class ID
[illegible]	displays text stores integer	Name/ID of the class for which the current class is an alias; visible only when status is IADB or alias

[illegible]	displays text stores integer	[illegible] which the current class is a sub item, visible only when status is TBD or baseline
[illegible]	displays text stores integer	[illegible] which the current class is a subclass, visible only when status is TBD or baseline
[illegible]	displays text stores integer	[illegible] are aliases of the current class, visible only when status is TBD or baseline
[illegible]	displays text stores integer	[illegible] are sub items of the current class, visible only when status is TBD or baseline
[illegible]	displays text stores integer	[illegible] are subclasses of the current class, visible only when status is TBD or baseline

BUTTONS:

[illegible]	[illegible]
[illegible]	[illegible] which to search
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible] class
[illegible]	[illegible]
[illegible]	[illegible] current class
[illegible]	[illegible]
[illegible]	[illegible] current class
[illegible]	[illegible]

4.3.2.13 IADB Add Aliases/Add Sub-items/Add Subclasses Screen

The Add Aliases, Add Sub-items, and Add Subclasses screens enable analysts to create relationships between the current data item class on the data dictionary screen and other

classes selected from the subordinate screen(s). Only the Add Aliases screen is shown here, as the three screens are virtually identical.

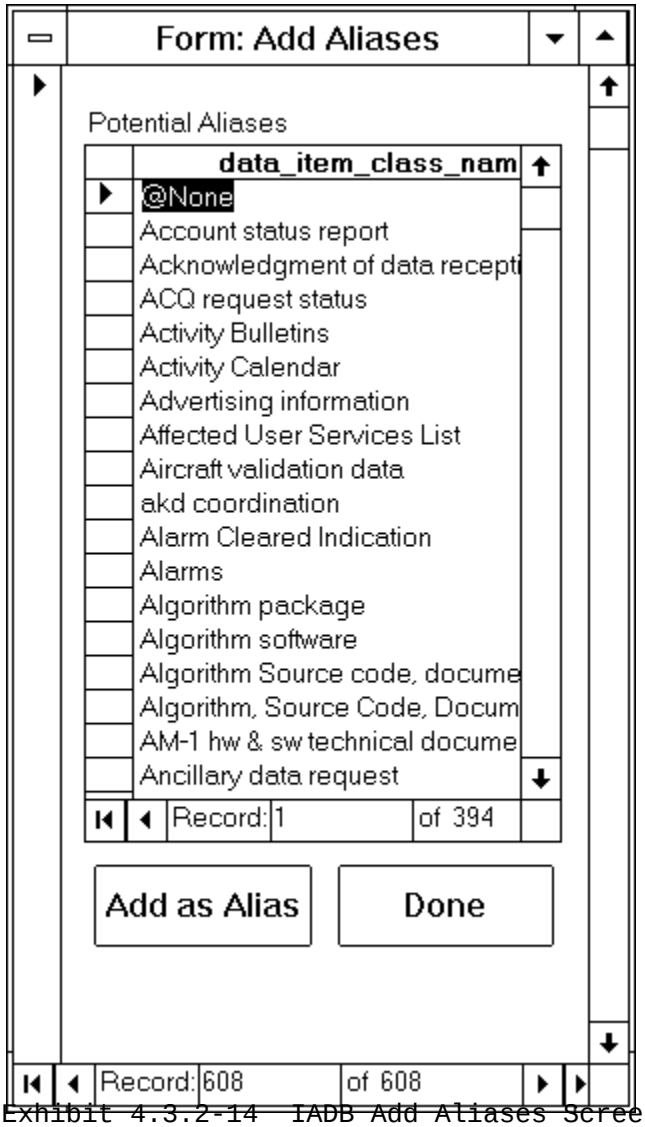

Exhibit 4.3.2-14 IADB Add Aliases Screen

FIELDS:

Field	Data Type	Source
Class Name	text	data item class names that are not already aliases for current data item class from Data Dictionary screen

BUTTONS:

Button	Action

Add as Child	Creates the child relationship between the current data item class from the Data Dictionary screen and the currently selected data item class in the Add Aliases screen, and removes the latter from the selection list.
Done	Closes the Add Aliases screen.

4.3.2.14 IADB Generate Report Screen

This screen enables any of a variety of reports to be generated pertaining to the contents, consistency and completeness of the interface specifications and data dictionary.

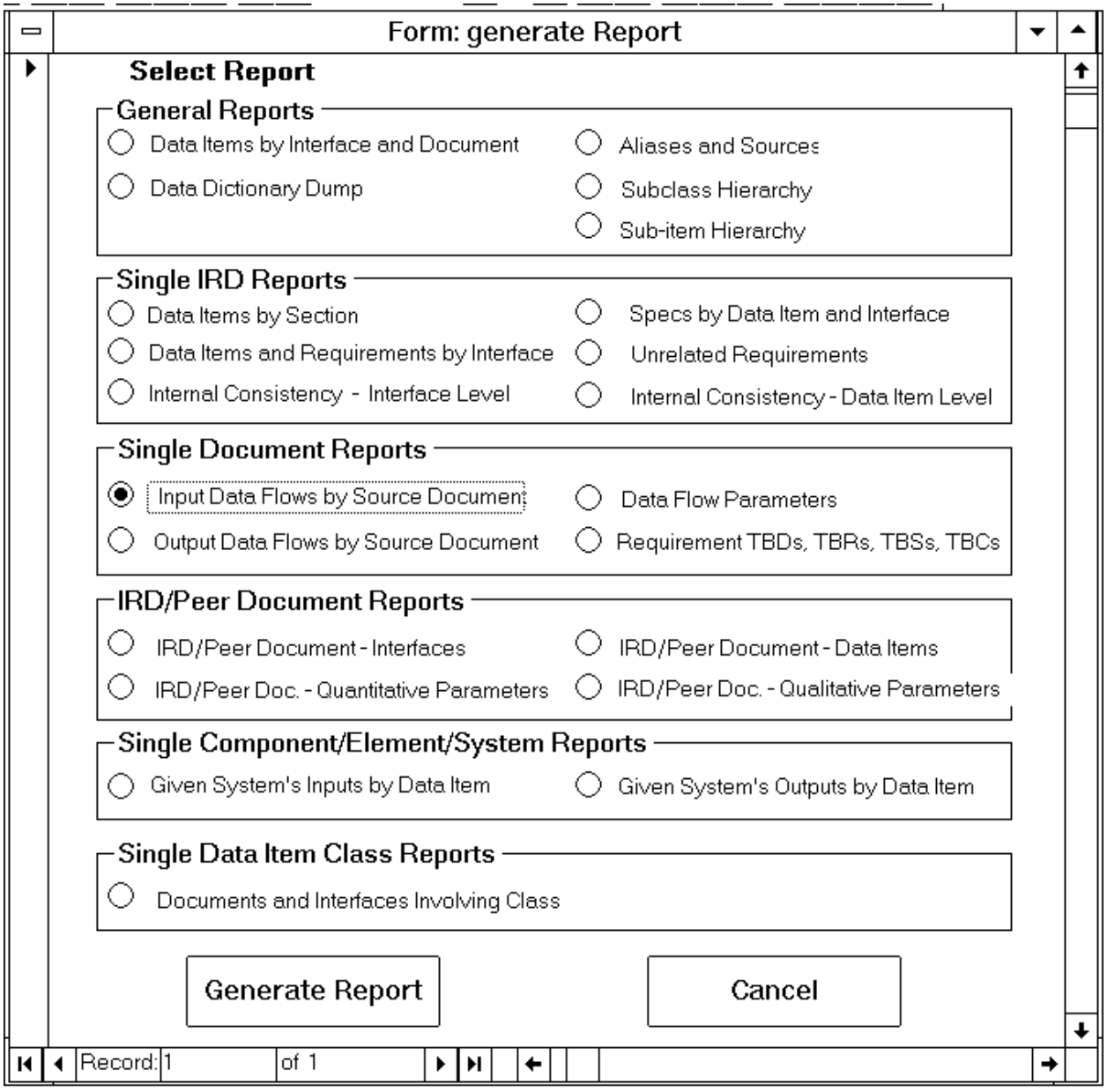

Exhibit 4.3.2-15 IADB Generate Report Screen

BUTTONS:

[illegible]	[illegible] opens a subordinate screen from which the user selects the document, component/element/system, or data item class upon which the report is to be based.
[illegible]	[illegible]

4.3.3 IADB Messages

4.3.3.1 Informational Messages

TBS

4.3.3.2 Warning Messages

TBS

4.3.3.3 Error Messages

TBS

4.4 Test Management Database (TMDB)

The Test Management database (TMDB) application is a tool that aids the analysts in the testing of requirements. Capabilities exist to selectively browse requirements with criteria such as: description keywords, release categories, requirement prefixes, requirement class IDs, segments, requirement statuses, types, source interfaces, and destination interfaces. Additional tasks allow the analyst to collect specific requirements under the guise of a Functional test thread. A test thread is defined to evaluate a specific service/task or a set of closely coupled services/tasks. A test thread confirms the ability to satisfy the requirements of a specific function in an isolated environment. Close examination of the specific or related services/tasks result in a grouping of requirements which point to a test thread. The test thread is broken down to several test cases to test the requirements, i.e. identify whether this service/task is able to satisfy all it's requirements. Test procedures, still retaining requirement traceability to the thread level, are developed for each test case. Finally, capabilities exist to prepare for test session planning, collect test session results, daily and flash test session reports, and support the preparation of the functional thread formal test report.

This application retains requirement traceability from the thread level through the test procedure level and permits the analyst to collect the test development and reporting information in a single repository. The application was developed to be portable and client/server based. Network connectivity over the Internet enables direct access to files from a testing site. Also for more remote areas there exists a high speed modem for access to the server in the absence of any internet connectivity.

4.4.1 TMDB Installation and Startup

The TMDB application requires remote access to the Sybase database on the FAIRMONT server where the requirements data is stored. In order to connect to these remote databases network connectivity software is used. Open Client is used to connect to Sybase. This product must be installed on the client machine before the TMDB executable software can be executed. See Appendix A for detailed instructions on Open Client installation.

Once the connectivity software is installed and tested a C:\TMDB subdirectory should be created on the client machine. This subdirectory should contain: a copy of the program executable, the necessary report files, and the deployment files supplied by Gupta for SQLWindows applications. See Appendix C for a listing of these files.

4.4.2 TMDB GUI

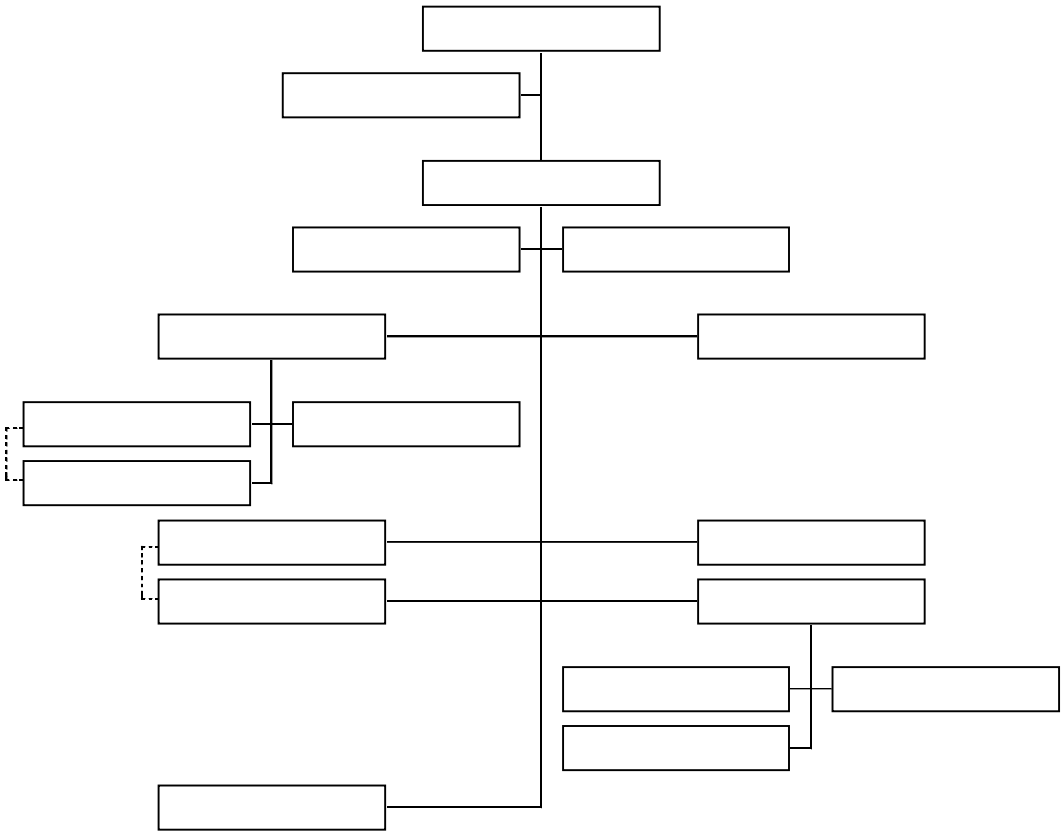

Exhibit 4.4.2-1 TMDB Menu Hierarchy

Exhibit 4.4.2-1 represents the hierarchy of menu choices presented in using the TMDB. The following subsections detail the user interface design for the TMDB.

4.4.2.1 TMDB Login Screen

The ISE TMDB Login screen controls access to the tool by requiring a user to enter a name and a password. The users name is validated against the authorized users reflected on the Analysts Maintenance Interface Screen. Three tries are permitted before the application aborts. A user may enter ‘pass’ in the user name field to activate a Password Modification Interface Screen. This screen permits the user to change their password. The TMDB ‘Release’ field identifies the release and version of the TMDB executable.

FIELDS:

1. USER NAME
   This data entry field accepts users Login name. A list of user names is stored in the ANALYSTS table under SYBASE. ‘pass’ may be entered to modify the password.
2. PASSWORD
   This data entry field accepts a user defined password. Passwords are stored in the ANALYSTS table under SYBASE.
3. Release
   This display field identifies the current release and version of the executing application.

BUTTONS:

1. LOGIN (ALT - L)
   Checks the ANALYSTS table to see if the user’s Login Name is valid and invokes the Activity Selection Screen. This button is the default screen focus, i.e., after tabbing the data entry fields after input, just hit the ‘Enter’ key to submit for Login verification.
2. EXIT (ALT - X)
   Exits the TMDB Application.

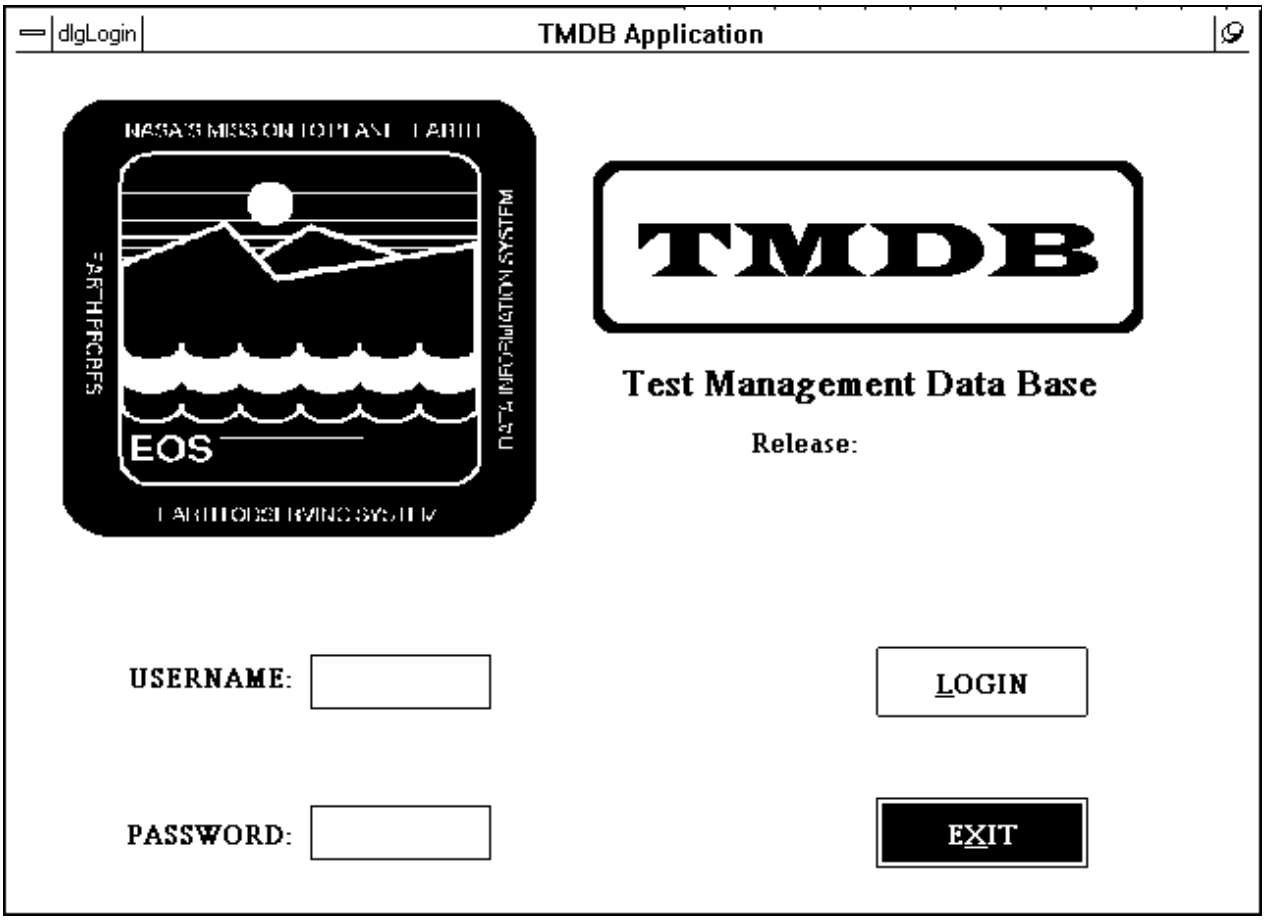

Exhibit 4.4.2-2 TMDB Login Screen

4.4.2.2 TMDB Password Modification Screen

The Password Modification Screen is activated by typing ‘pass’ in the user name field of the Login screen. The purpose is allow the user a process to modify their password. The fields are self prompting and focusing.

FIELDS:

1. USER NAME
   This data entry field allows the user to enter their username as defined in the analysts table stored within SYBASE.
2. OLD PASSWORD
   This data entry field allows the user to enter their old password.
3. NEW PASSWORD
   This data entry field allows the user to enter their new password.
4. VERIFY NEW PASSWORD
   This data entry field allows the user to enter their new password again for verification purposes.

BUTTONS:

1. SAVE & EXIT
   This button saves the new password and then requires the user to Login into the system.

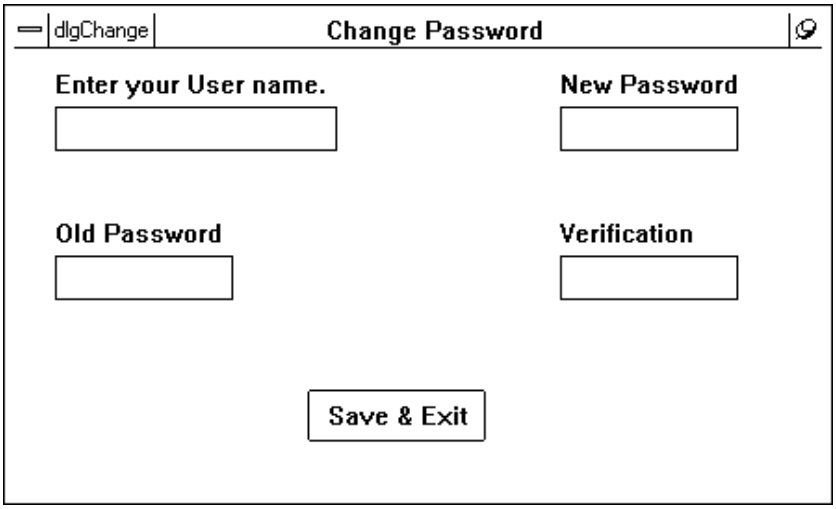

Exhibit 4.4.2-3 TMDB Password Modification Screen

4.4.2.3 TMDB Activity Selection Screen

The Activity Selection Screen enables users to select from a variety of TMDB functions. They are arranged into 4 areas: Master Test Plan Development, Detailed Test Plan Development, Test Session and Reporting Support, and maintenance activities. The Master Test Plan Development section enables the analyst to define, view, or print threads and refine the thread testing method along with evaluation method and miscellaneous notes pertaining to expected test results. Detailed Test Plan Development section leads the analyst through the test case and test procedure definition phases. The Test Session and Reporting Support section holds numerous functions: Test session planning and resource allocation, test session recording of procedure results, support for daily, flash, and formal reporting. Also in this section is a Personnel Locator function enabling the analyst to locate any program related personnel. The function contains: phone and fax numbers, e-mail addresses, company, and responsibility. The currently supported RTM release date and the ISE Load date are reflected in the lower left corner.

This is the top level screen after the Login panel. Leaving this screen returns the user to the MS Window environment.

FIELDS:

1. Hughes RTM Release Date
   This display field shows the date Hughes dumped their RTM database.
2. ISE Load Date
   This display field shows the date the Hughes version was loaded onto the ISE with the RTM-to-ISE tool.

BUTTONS:

1. FTG - “FUNCTIONAL TEST THREAD GENERATOR”
   This button activates the Functional Test Thread Generator dialog screen facilitating: Create, Open, Print, Delete, and Quit functions.
2. TRMD - “TEST REQUIREMENT METHOD DEFINITION”
   This button activates the Test Requirement Method Definition Screen which enables the analyst to identify testing methods, test criteria, evaluation methods, and notes on expected results for each requirement in the Functional Test Thread.
3. TCS - “TEST CASE SUPPORT”
   This button activates the Test Case Support Screen which allows the analyst to develop test cases for each thread, mapping requirements to each test case, establish prerequisite conditions, test inputs, expected test case results, Methods for results analysis, and assumptions and constraints.
4. TPS - “TEST PROCEDURE SUPPORT”
   This button activates the Test Procedure Support Screen which allows the analyst to bring up a screen to generate test case procedures.
5. TRSP - “TEST SESSION RESOURCE SCHEDULING/PLANNING”
   This button activates the Test Session Resource Scheduling and Planning Screen

which is used to develop test session planning data for submittal to the scheduler. Resource allocation and session notes are among the information captured.

6. TSR - "TEST SESSION REPORTING"
   This button activates the Test Session Reporting Screen which permits the test conductor to capture the actual test results and based on the expected results, enter a pass/fail stamp.
7. PERSONNEL - "PERSONNEL LOCATOR"
   This button activates the Personnel Locator Screen which allows all users to look up personnel on the program. New people can be added or changes made as needed.
8. "ANALYST" MAINTENANCE
   This button activates the Analyst Maintenance Screen which permits authorized users to add /change/delete analysts and assign Login username and password with appropriate access levels.
9. ccMAIL
   This button activates a ccMail interface for the user.
10. QUIT (ALT - Q)
    This button closes the window and exits the TMDB application.

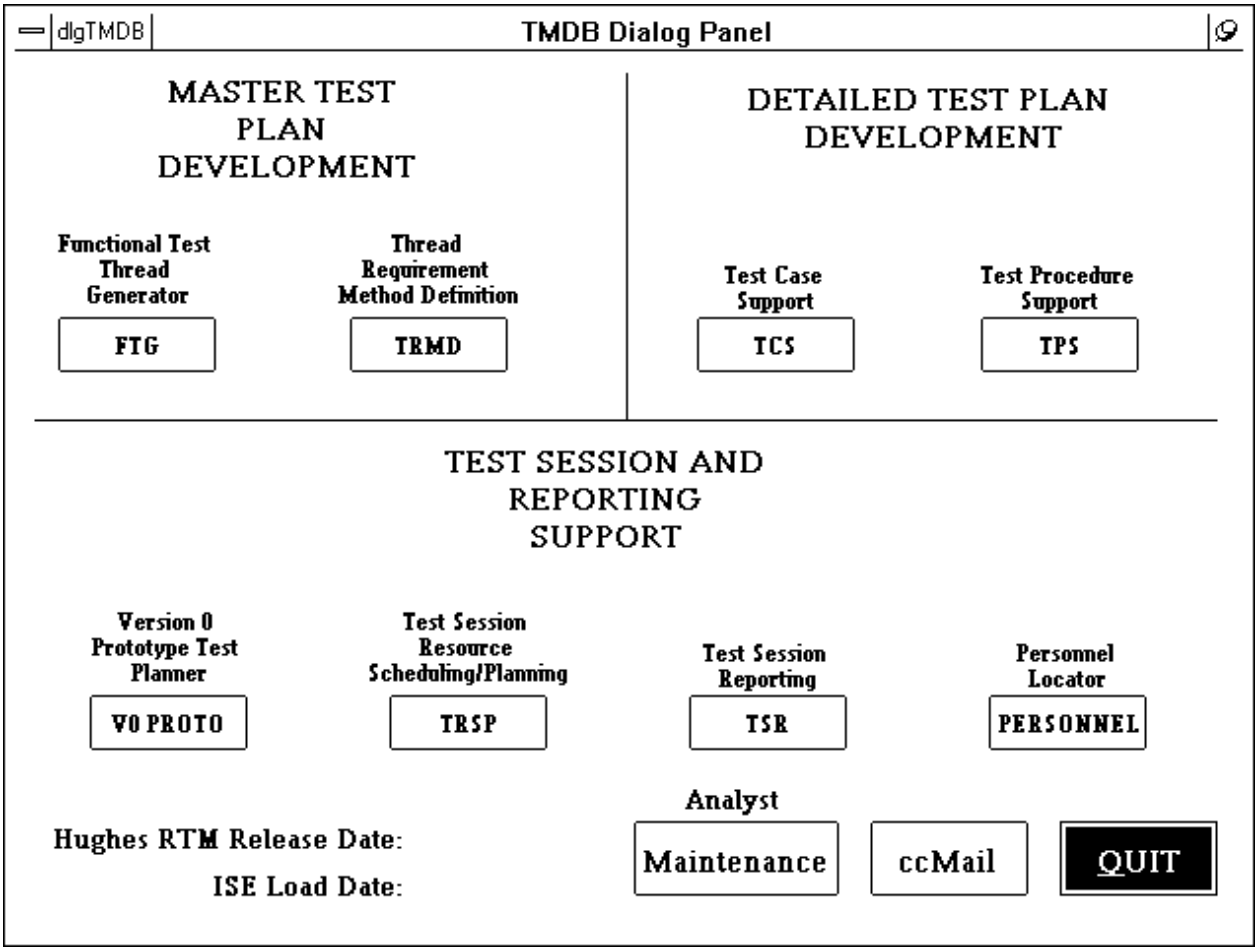

Exhibit 4.4.2-4 TMDB Activity Selection Screen

4.4.2.4 TMDB Analysts Maintenance

The Analysts Maintenance Screen permits the administrative user to add and delete analysts/users from the application. The analyst only has the permission/access level to modify their password that is facilitated from the Login screen, refer to section 4.4.2.1. The administrative user also has authority to modify the access level of control, i.e., the save and delete authorities of an analyst. The various levels of control include:

1 This level is for the administrative user. This access level grants the authority to add an delete users, plus modify any database records desired.
2 This level is for the supervisor. They would have permission to modify any database records of a higher access control, i.e., level 2.
3 This level is for the individual analyst. The access level permits creation and modification of only their own records.

Control returns to the Activity Selection Screen, section 4.4.2.3.

FIELDS:

1. NAME - Table Column
   This data entry field is the analysts full name for all documentation purposes
2. NUMBER - Table Column
   This data entry field is the analysts number, internal use only.
3. LOGIN NAME - Table Column
   This data entry field is for the analysts Login user name.
4. PASSWORD - Table Column
   This data entry field is for the analysts Login password. This column may be modified by the analyst and the authorized user. The analyst can use the 'pass' Login in the Login user name to modify this column. Refer to Section 4.4.2.1
5. ACCESS LEVEL - Table Column
   This data entry field is to allow the administrative user to limit the capabilities of the particular user.

BUTTONS:

1. ADD (ALT - A)
   This button allows the authorized user to insert a new user, assigning analyst name, Login username, password, user number and the access level.
2. SAVE (ALT - S)
   This button allows the authorized user to permanently save a user to the ANALYSTS table after adding him to the screen table.
3. DELETE (ALT - D)
   This button allows the authorized user to delete a user.
4. QUIT (ALT - Q)
   This button allows the user to terminate this screen and return to the Configuration Selection Screen, section 4.4.2.3.

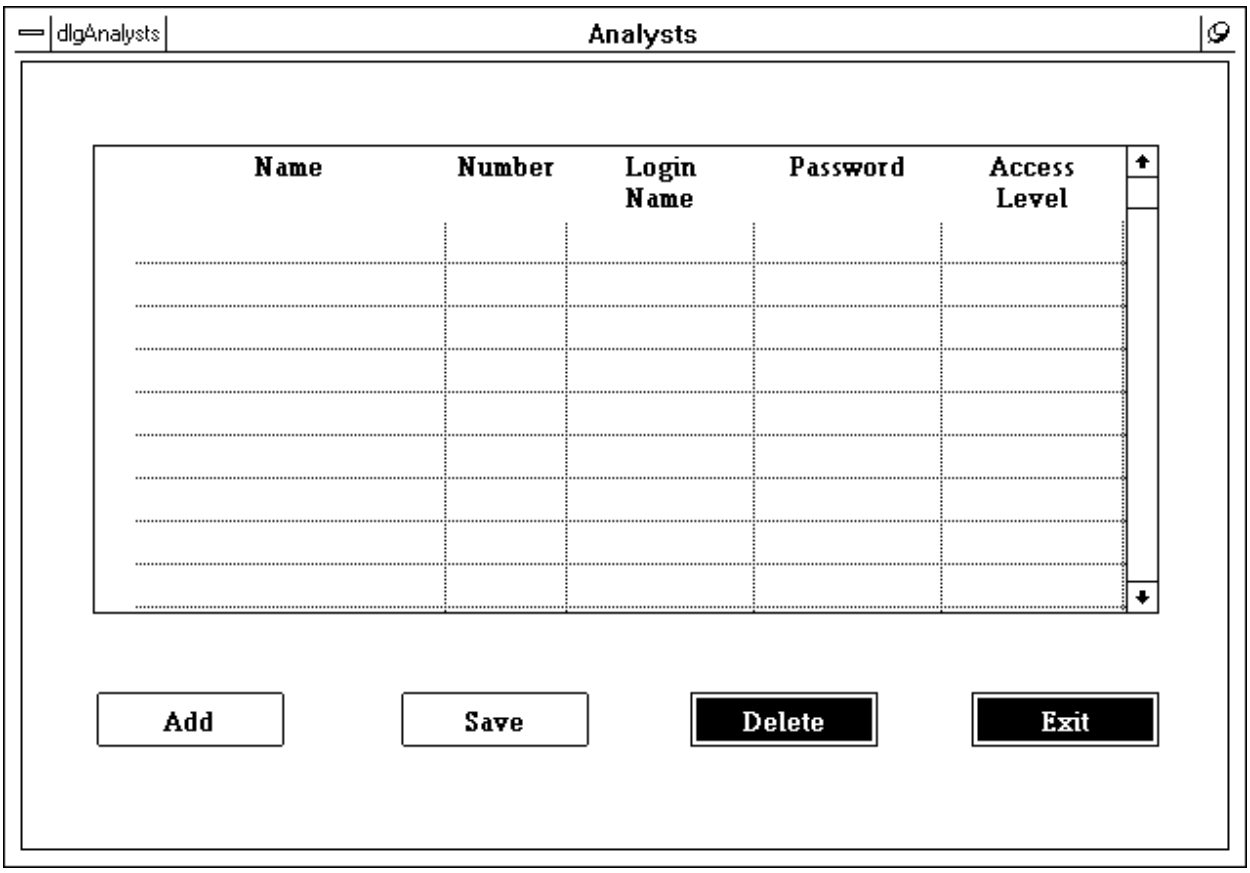

Exhibit 4.4.2-5 TMDB Analysts Maintenance Screen

4.4.2.5 TMDB ccMail Interface

This screen provides an interface to the users local mail environment. This is currently a fully functional Lotus ccMail interface. When the Send button is depressed, the dialog screen that comes up allows the user to then select priority, whether a receipt is requested, any attachments desired. The subject can also be modified in addition to full addressing capability.

Control returns to the Activity Selection Screen, section 4.4.2.3.

FIELDS:

1. Priority - Table Column
   This display field is the message priority.
2. Date Received - Table Column
   This display field is the date the message was received.
3. Originator - Table Column
   This display field is the author of the message.
4. Subject - Table Column
   This display field is the subject of the received message.
5. Subject
   This field displays subject of selected mail item in table. Same as item 4. For new mail, this is the entry field for the subject.
6. Date Received
   This field displays date received of selected mail item in table. Same as item 2. For new mail, the current date is supplied.
7. From
   This field displays author of selected mail item in table. Same as item 3. For new mail, Author is supplied.
8. Attachments
   This window itemizes attachments included with selected mail item in table. This field is active for incoming mail only.
9. Message Text
   This field displays the message text of the selected mail item in the table or acts as the write pad for a new message.

BUTTONS:

1. NEW (ALT - N)
   This button creates a new mail message for the user.
2. FORWARD (ALT - F)
   This button allows the user to forward an existing mail item to other addressed users.
3. REPLY (ALT - R)
   This button allows the user to reply to the sender of an existing mail item.
4. ADDRESS (ALT - A)
   This button allows the user to address a new or forwarded mail message.

5. DELETE (ALT - D)
   This button allows the user to maintain their mail interface by deleting unwanted mail.
6. SEND (ALT - S)
   This button allows the user to send new, forwarded or replied mail. This button also brings up a utility window allowing the user to address their mail along with the capability to address, include attachments, set priorities, and request receive receipts.
7. LOGOUT (ALT - O)
   This button logs the user out of the ccMail environment and return to the Activity Selection Screen, section 4.4.2.3.

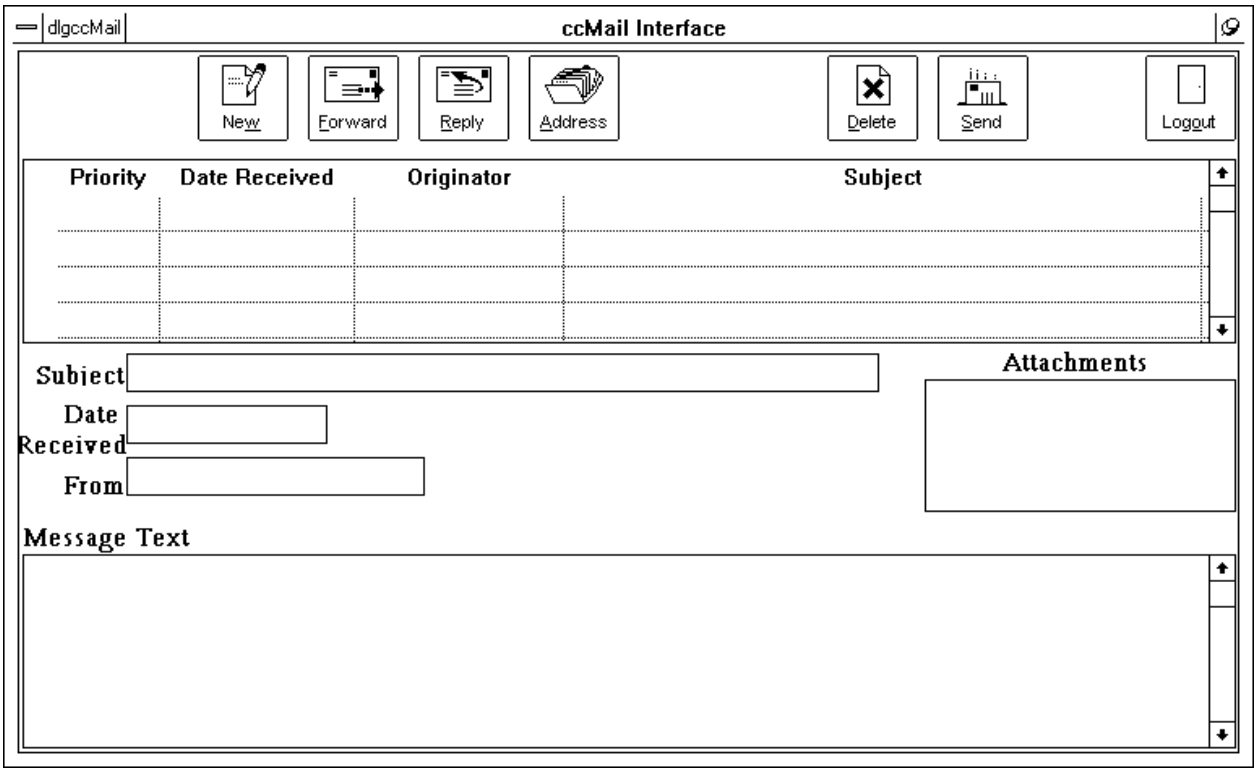

Exhibit 4.4.2-6 TMDB ccMail Interface Screen

4.4.2.6 TMDB Functional Test Thread Activity Screen

The purpose of this screen is to facilitate the analyst's desired activity, to Create, Open, Print, or Delete a test thread. The central table displays all existing test threads, the date last modified, and the author of the thread. Selecting a particular test thread produces a description and a requirement count in the fields below. The Open, Print, and Delete keys require a test thread to be selected before any action can be taken. The naming and description of a test thread is done subsequent to the generation of a thread with the Create thread query button.

Control returns to the Activity Selection Screen, section 4.4.2.3.

FIELDS:

1. Functional Test Thread ID
   This display field identifies all of the available test thread IDs. This field is initialized when the window comes up and is a read only.
2. Date Modified
   This display field denotes the date the 'Functional Test Thread ID' was last modified. This field is initialized when the window comes up and is a read only.
3. Author
   This display field denotes the author of the 'Functional Test Thread ID'. This field is initialized when the window comes up and is a read only.
4. Functional Thread Description
   This field displays a description of the selected 'Functional Test Thread ID'. This field is activated when clicking on any Test Thread line and is read only.
5. # of Requirements associated with this thread
   This field displays the number of requirements associated with the selected 'Functional Test Thread ID'. This field is activated when clicking on any Test Thread line and is read only.

MENU ITEMS:

1. I/F Maintenance
   This Menu item directs the analyst to an interface alias page for maintenance of all of the requirement source and destination interfaces, refer to Section 4.4.2.7.

BUTTONS:

1. CREATE (ALT - C)
   This button activates the Query Generation Screen, Section 4.4.2.7. On this screen the analyst constructs a SYBASE query to extract requirements based on some criteria.
2. OPEN (ALT - O)
   This button opens a selected 'Functional Test Thread ID'. The owner of the thread and any one with lower access control are able to modify this thread and save. All others are placed in a view only mode.

3. PRINT (ALT - P)
   This button prints the selected 'Functional Test Thread ID'.
4. DELETE (ALT - D)
   This button deletes the selected 'Functional Test Thread ID'. Once again only the owner or any one with lower access control is able to perform this delete operation.
5. QUIT (ALT - Q)
   This button closes the current screen and returns to the TMDB Activity Screen, refer to Section 4.4.2.3.

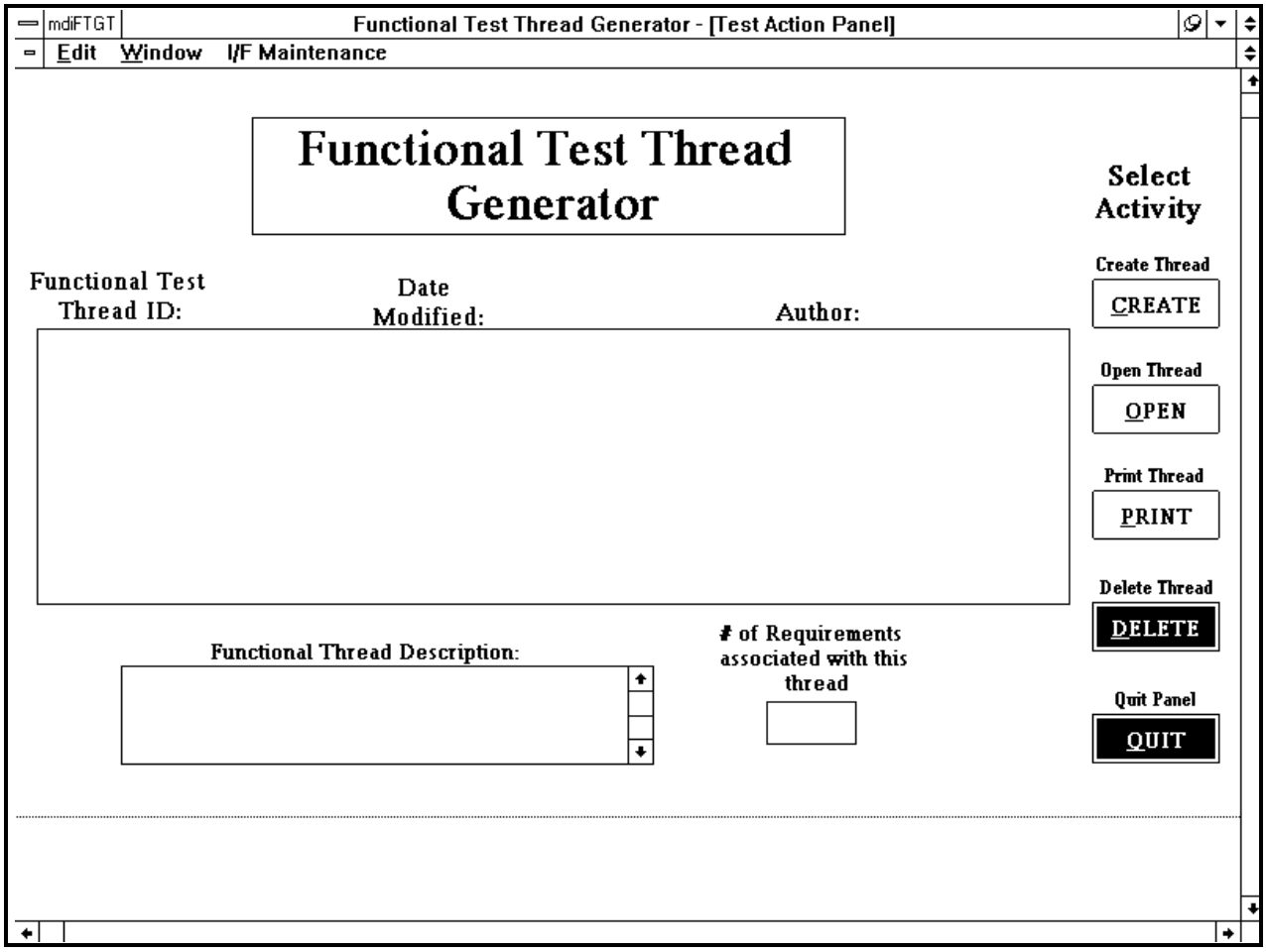

Exhibit 4.4.2-7 TMDB Functional Test Thread Activity Screen

4.4.2.7 TMDB Interface Maintenance Screen

When this screen is activated there is a wait cursor displayed. The wait is for the screen to populate the Source Interfaces 'RQ SOURCE' column and Destination Interfaces 'RQ DEST' column to be populated. These data are all of the unique source and destination interfaces from all of the requirements in the SYBASE REQMNTS requirements table. Also, the 'CB SOURCE' and 'CB DEST' columns are populated from the SYBASE SOURCE and DESTINATION tables. The purpose of this screen is to create an alias for all like 'RQ SOURCE' and 'RQ DEST' fields using the 'CB SOURCE' and 'CB DEST' column entries. Several of these requirement source, 'RQ SOURCE', and destination interfaces, 'RQ DEST', are spelled slightly differently or incorrectly and appear as different interfaces. This alias column simplifies the user's ability to select an alias for a given requirement source and destination interface. The query generated substitutes the actuals for the alias in the where clause as the query is constructed. When a new requirement interface appears, the specific 'CB' field is blank. To maintain this alias capability the user must drag and drop from the 'Drag And Drop' column into the CB column the desired alias. Or, if a new alias is required, add it to the CB Source column by double clicking so when the configuration is saved it is updated in the Drag And Drop column for subsequent use.

Control returns to the Functional Test Thread Activity Screen, refer to section 4.4.2.7.

FIELDS:

1. RQ SOURCE
   This display column contains all of the unique source interfaces that appear in the requirements.
2. CB SOURCE
   This data entry column contains the particular alias associated with each RQ SOURCE entry. New entries can be added or existing ones can be modified or existing ones can be dropped from the Drag And Drop column.
3. SOURCE INTERFACES - "Drag And Drop"
   This display column contains all of the unique aliases for the CB SOURCE column. Items in this column can be selected and drag and dropped onto existing or blank records of the CB SOURCE column.
4. RQ DEST
   This display column contains all of the unique destination interfaces that appear in the requirements.
5. CB DEST
   This entry column contains the particular alias associated with each RQ DESTINATION entry. New entries can be added or existing ones can be modified or existing ones can be dropped from the Drag And Drop column..
6. DESTINATION INTERFACES - "Drag And Drop "
   This display column contains all of the unique aliases for the CB DESTINATION column. Items in this column can be selected and drag and dropped onto existing or blank records of the CB DESTINATION column.

BUTTONS:

1. SAVE (ALT - S)
   This button saves the current interface relationship. Deletes are done first, followed by inserts and finally updates.
2. QUIT (ALT - Q)
   This button closes this screen and returns to analyst to the Functional Test Thread Activity Screen, Section 4.4.2.7.

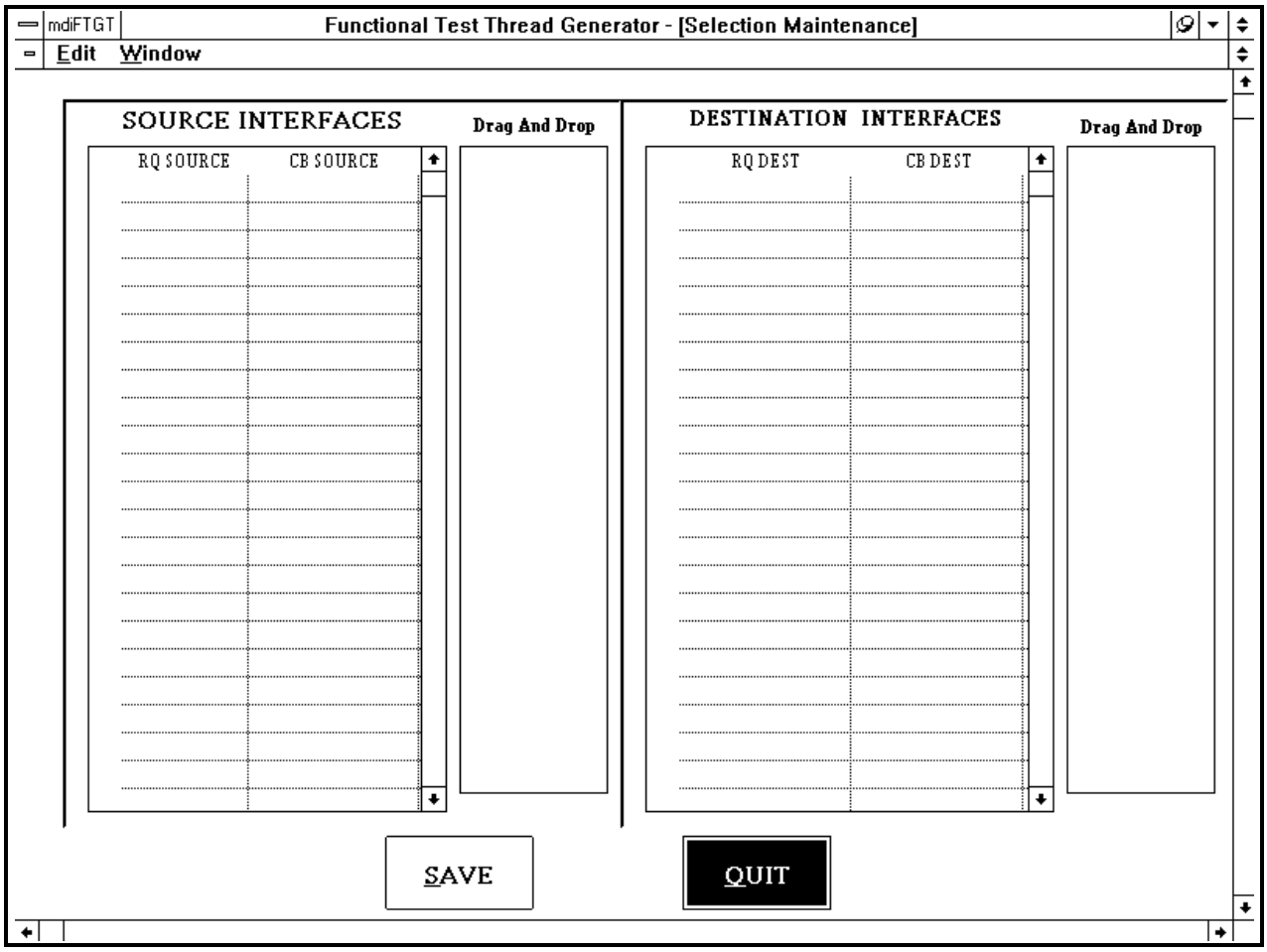

Exhibit 4.4.2-8 TMDB Interface Maintenance Screen

4.4.2.8 TMDB Generate Test Thread Select Statement Screen

The purpose of the Generate Test Thread Select Statement Screen is to generate functional test threads. Through the use of the many buttons and fields, the analyst constructs a Select query which is submitted to the Requirements database. This query fetches all of the requirements that are constrained by the Where clause. The objective of this screen is only to construct the query and submit it then activate the following panel to view the results and possibly collect some of the requirements to be associated with a specific test thread. The resultant query is editable prior to submittal. All field settings are saved when returning from the Query Thread Generation and Requirement Mapping Screen.

Control returns to the Query Thread Generation and Requirement Mapping Screen, refer to section 4.4.2.7.

FIELDS:

1. Requirement Prefix
   This “combo-box” allows the analyst to select one of numerous requirement prefixes. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. The analyst may also enter their own Prefix by clicking the Requirement Prefix field and typing.
2. RELEASES
   This “combo-box” allows the analyst to select one of the available requirement releases: IR1 or Ir1, A, B, C, D. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted, however, the “*” can be selected to select all releases. This in effect removes any release criteria from the query. The analyst may also enter their own release by clicking the RELEASES field and typing.
3. CLASS_ID
   This “combo-box” allows the analyst to select one of the available requirement Class IDs: LEVEL_2, L3_FPRS, REQ_BY_REL, LEVEL_4, or IRD. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted however the “*” can be selected to select all Class IDs. This in effect removes any Class ID criteria from the query. The analyst may also enter their own Class ID by clicking the CLASS_ID field and typing.
4. SEGMENT
   This “combo-box” allows the analyst to select one of the available requirement Segments: FOS, CSMS, SDPS. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted however the “*” can be selected to select all Segments. This in effect removes any Segment criteria from the query. The analyst may also enter their own segment by clicking the SEGMENT field and typing.
5. REQ_STATUS
   This “combo-box” allows the analyst to select one of the available requirement status categories: approved, in-review, delayed, disapproved, or TBD. Clicking the down

arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted, however, the "*" can be selected to select all Status categories. This in effect removes any Status criteria from the query. The analyst may also enter their own Status category by clicking the REQ_STATUS field and typing.

6. REQ_TYPE
   This "combo-box" allows the analyst to select one of the available requirement types: performance, functional, operational, procedural, security, interface, RMA or evolvable. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted however the "*" can be selected to select all of the requirement types. This in effect removes any requirement type criteria from the query. The analyst may also enter their own requirement type by clicking the REQ_TYPE field and typing.
7. INTERFACE SOURCE
   This "combo-box" allows the analyst to select one of the available requirement interface sources. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted. The analyst may also enter their own interface source by clicking the INTERFACE SOURCE field and typing.
8. INTERFACE DESTINATION
   This "combo-box" allows the analyst to select one of the available requirement destination sources. Clicking the down arrow adjacent to the field reveals the made-to-order selections available to choose from. Only one selection is permitted. The analyst may also enter their own interface destination by clicking the INTERFACE DESTINATION field and typing.
9. New Query Word
   This field allows the analyst to add a new query word to the "Existing Query Words" table. A window appears asking if this addition is temporary, i.e. this session, or permanent. The analyst must respond accordingly. The Add button indicates when action is requested after editing this field.
10. Existing Query Words
    This "listbox" alphabetically lists all of the currently available words that can be used as keywords when querying the requirement description field. Keywords can be added as indicated in item 9 or deleted by selecting a keyword and depressing the "Delete Query Word" bar below this box.
11. Your Editable Query Statement
    As the query is being constructed the results are displayed in this box. This box is editable. So, if the analyst wants to parenthesize with AND's and/or OR's, this can be accomplished by just editing the Select query prior to submittal.

BUTTONS:

1. Add (ALT - A)
   This button as discussed in field 9, adds a query word to the query table. A message asks for a temporary or permanent status.

2. ECS or EBNet or EDOS "Component Selection"
   This is a set of radio buttons designed, but not currently active, to select which component requirement table is being used to query. Currently only the ECS is implemented and selected by default.
3. DELETE QUERY WORD (ALT - D)
   This button deletes a selected query word from the query word list.
4. UNASSIGNED (ALT - U)
   This button generates a query that selects all of the requirements, within the constraints imposed with whatever other criteria have been included in the query construction, that are not currently assigned to any functional test thread. If the query is not carefully composed, this select could take a long time depending the number of unassigned requirements.
5. CLEAR (ALT - C)
   This button clears the entire screen of all selections.
6. SUBMIT (ALT - S)
   This button closes this screen and bring up the subsequent screen, refer to section 4.4.2.9, that displays the results of the query.
7. QUIT (ALT - Q)
   The QUIT button closes this screen and returns to analyst to the Functional Test Thread Activity Screen, Section 4.4.2.7.

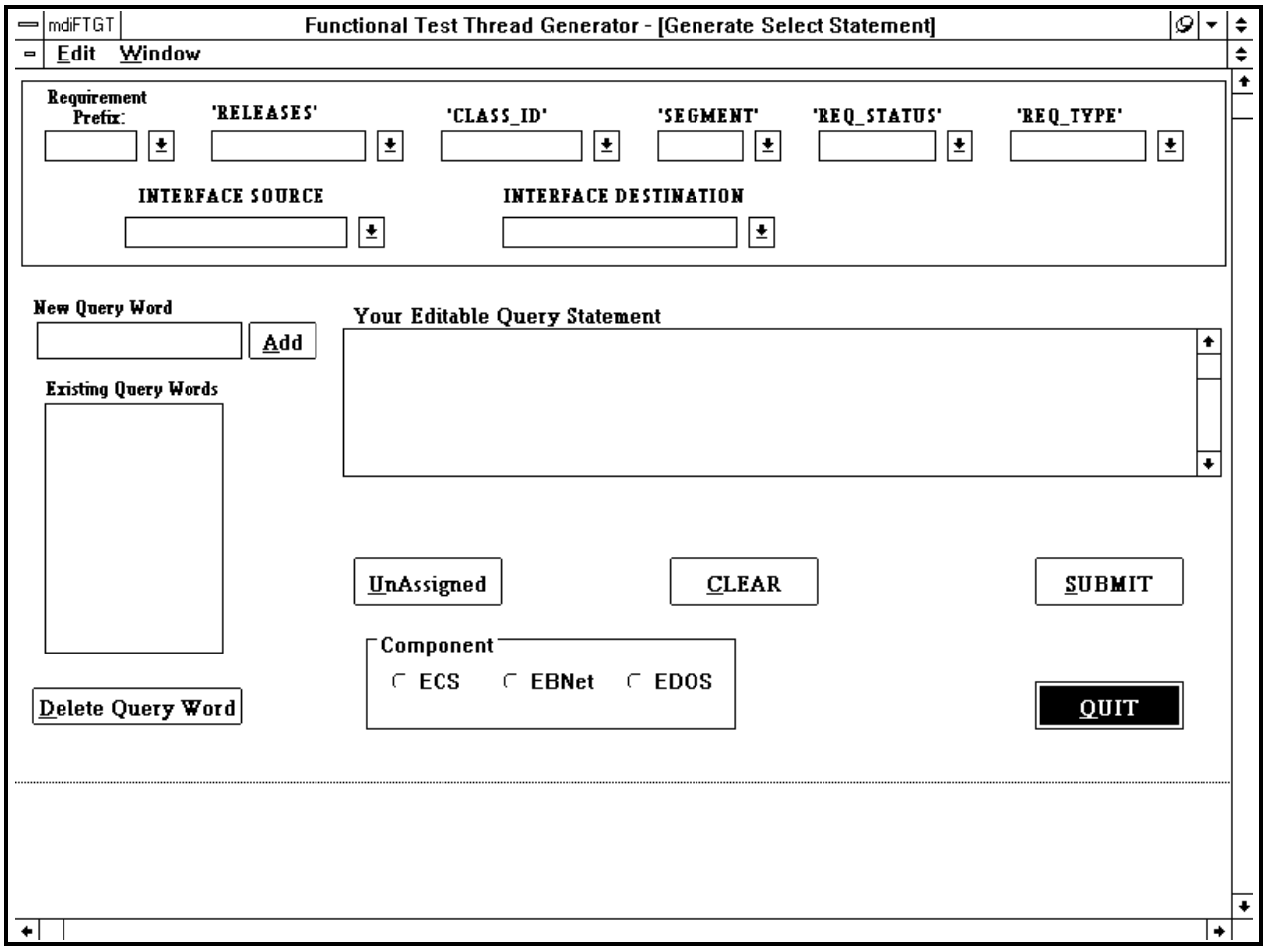

Exhibit 4.4.2-9 TMDB Generate Test Thread Select Statement Screen

4.4.2.9 TMDB Query Thread Generation and Requirement Mapping Screen

The objective of the Query Thread Generation and Requirement Mapping Screen is to capture requirements and associate them with a Functional Test Thread name. This screen is activated from two sources. The first is the "opening' of a test thread selected on the test thread action panel. When this option is selected, this query panel is activated directly and all of the information associated, including requirements, is loaded into the respective fields. All requirements associated with the thread are colored red in the requirements table. Secondly, this screen comes up to display the results of a query. The result screen does not initially have a thread name unless a thread name has been saved for this query session, but the Thread ID field is editable and the user is prompted to save his results if the user tries to quit this screen without saving. As indicated previously, the objective of this screen is the mapping of requirements to a functional test thread and it is an iterative process. Numerous passes back to the query generation screen to select groups of requirements, and returning to this screen to select specific requirements to map to this specific test thread is allowed. Requirements are selected with the "select" key and deselected with the "deselect" key. Selected requirements are collected in the "requirements collected" listbox. There is a field entry for a description, objective, purpose, or intent to fully describe this test thread. Each time this screen is activated by the query screen, the resultant query is displayed in the "Query Select Statement". There is another technique to select requirements and that is with the "Select All" key which selects all of the requirements in the table. To clear all of the requirements collected for a thread in the listbox, depress the Clear List button.

Control returns to the Query screen, section 4.4.2.8, by depressing RESELECT or returns to the Functional Test Thread Activity Screen, Section 4.4.2.7 when depressing QUIT.

FIELDS:

1. Thread ID
   This data entry field contains the functional test thread ID name just opened from the activity panel. Or, this field contains the name of a functional test thread ID just created from a set of requirements selected via a query.
2. Thread Description
   This data entry field contains a description of the test thread. This field contains any saved description when performing a OPEN or is blank until completed when doing requirement captures from the query screen. Already saved descriptions can be modified at any time.
3. Query Select Statement
   This display field contains the query used to capture the black displayed requirements. The query is the same as the one constructed from the query screen. If coming from the thread open on the activity panel, this field is not visible.
4. Total Reqmts
   This display field reports the number of requirements fetched from the select query in addition to the number of requirements retrieved from a saved test thread.

5. Requirements Collected
   This display window box presents the requirements collected for a given thread. Requirements can be removed by the requirement deselection or added by requirement selection buttons.
6. Requirement ID - Table Column
   This display field in the table presents the requirement ID or title of a fetched requirement.
7. Description - Table Column
   This display field in the table presents the requirement description associated with the fetched requirement
8. Clarification - Table Column
   This display field in the table presents a clarification of release information associated with the fetched requirement.
9. Releases - Table Column - Scroll Right
   This display field in the table presents the release(s) associated with the fetched requirement.
10. Class_ID - Table Column - Scroll Right
    This display field in the table presents the Class ID associated with the fetched requirement.
11. Req_Status - Table Column - Scroll Right
    This display field in the table presents the requirement status associated with the fetched requirement.
12. Req_Type - Table Column - Scroll Right
    This display field in the table presents the requirement type associated with the fetched requirement.
13. Source - Table Column - Scroll Right
    This display field in the table presents the source interface associated with the fetched requirement.
14. Destination - Table Column - Scroll Right
    This display field in the table presents the source destination associated with the fetched requirement.
15. Assigned - Table Column - Scroll Right
    This display field in the table presents the number of functional test threads that reference or are associated with the fetched requirement.

BUTTONS:

1. “Right Arrow”
   `Select Requirement` This button copies the selected requirement in the table into the Requirements Collected list box and colors the selected table requirement row red indicating that this requirement is now associated with a functional test thread.
2. `Select All` (ALT - A)
   This button copies all of the requirements in the table into the Requirements Collected list box and colors all of the table requirement rows red indicating that this requirement is now associated with a functional test thread.

3. `Reselect` (ALT - R)
   Assemble New Query. This button returns or sends the analyst to the query generation screen to construct or modify their query.
4. `SAVE` (ALT - S)
   This button saves the Functional Test Thread ID and its associated fields to the requirements database.
5. "Left Arrow"

   `Deselect Requirement` This button "moves" the selected requirement in the Requirements Collected list box back to the requirements table and changes that row color from red to the default color.
6. `Clear List` (ALT - C)
   This button clears all of the requirements collected for this functional test thread. Note that unless saved, the requirements database is not altered.
7. `QUIT` (ALT - Q)
   The QUIT button closes this screen and returns the analyst to the Functional Test Thread Activity Screen, Section 4.4.2.7.

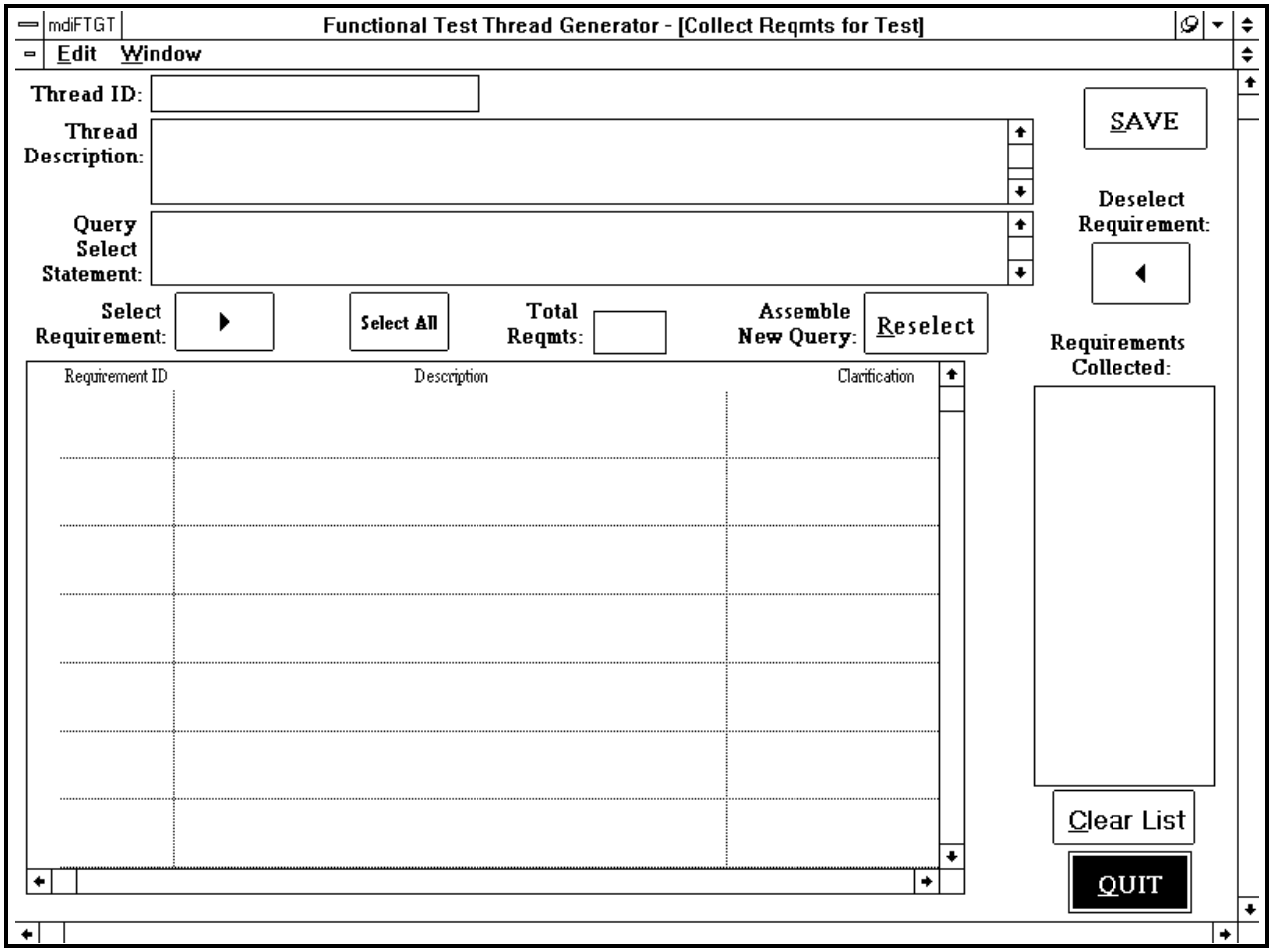

Exhibit 4.4.2-10 TMDB Query Thread Generation and Requirement Mapping Screen

4.4.2.10 TMDB Requirement Test Definition Screen

The Requirement Test Definition Screen is used to begin the conceptual test case development phase. Upon entering the screen, the analyst selects a Functional Test Thread. When selection is made, the application populates the: author field, the thread description field, and the requirements, description, Class ID, and Release fields of the table. The last two table fields, the Class ID and the Release are made visible by scrolling right. For each requirement collected for this test thread, a Test Method must be entered. The options are: Analysis, Demonstration, Inspection, and Test. This accomplished by clicking on the test method field and a pop up selection box is revealed. Simply click on the type of test and move to the next field. Clicking of the requirement field identifies in the "Other Test Threads" box the other functional test threads that reference this requirement. Also, if a selection is made in this box, a description of this functional thread appears in the "Other Test Thread Description" box. This feature is useful to eliminate testing duplication, or to ensure complete coverage. The next field ready for input is the "Test Criteria, Evaluation Methods, and Notes on Expected Results" field. The contents of this field are self-explanatory. As edits are made to these two fields, the row that has been selected turns red, indicating that an edit has been performed.

Upon completion of analyst input, a printout of this test thread can be prepared by clicking on the print button.

When QUIT is selected, control returns to the Activity Selection Screen, Section 4.4.2.3.

FIELDS:

1. Test Thread Selection
   Clicking the down arrow presents all of the saved functional test threads. The '*' selection presents all of the unique/distinct requirements associated with all of the saved functional test threads.
2. Author
   This field displays the author of a saved functional test thread when selected in step 1.
3. Test Thread Description
   This field displays the description/objective/summary associated with a saved functional test thread when selected in step 1.
4. Other Test Thread Description
   This field is displayed when a "Other Test Thread" is selected in field 5.
5. Other Test Threads Using this Requirement
   This field is populated by clicking on a Requirement cell in the table. When this window is then populated, selecting a functional test thread displays its associated description in field 4.
6. Requirements - Table Column
   This display table column presents all the collected requirements associated with the selected functional test thread selected from field 1. Clicking on this field displays all of the other functional test threads using this requirement in field 5.

7. Description - Table Column
   This display table column presents the requirement description associated with the requirement in field 6.
8. Test Method - Table Column
   This data entry table column permits the user to select the test method associated with each requirement. The options are dropped down when clicked or focused on. The available methods are: Analysis, Demonstration, Inspection, and Test.
9. Test Criteria, Evaluation Methods, and Notes on Expected Results - Table Column
   This data entry field permits the analyst to enter any test criteria, evaluation methods, or notes pertaining to the expected test results for each requirement.
10. Class ID - Table Column - Scroll Right (normally hidden)
    This display field presents the Class ID associated with the requirement. This is for reference only.
11. Release - Table Column - Scroll Right (normally hidden)
    This display field presents the Release(s) associated with the requirement. This is for reference only.

BUTTONS:

1. SAVE (ALT - S)
   This button saves: the Test Method field and the Test Criteria, Evaluation Methods, and Notes on Expected Results field associated with each requirement for the selected Test Thread Selection to the requirements database.
2. PRINT (ALT - P)
   This button prints the contents of this screen onto a tabular format or to a postscript or text file as requested. The print manager allows you to install the generic text printer and printing to file renders a text page, not a postscript page.
3. QUIT (ALT - Q)
   The QUIT button closes this screen and returns to analyst to Activity Selection Screen, Section 4.4.2.3.

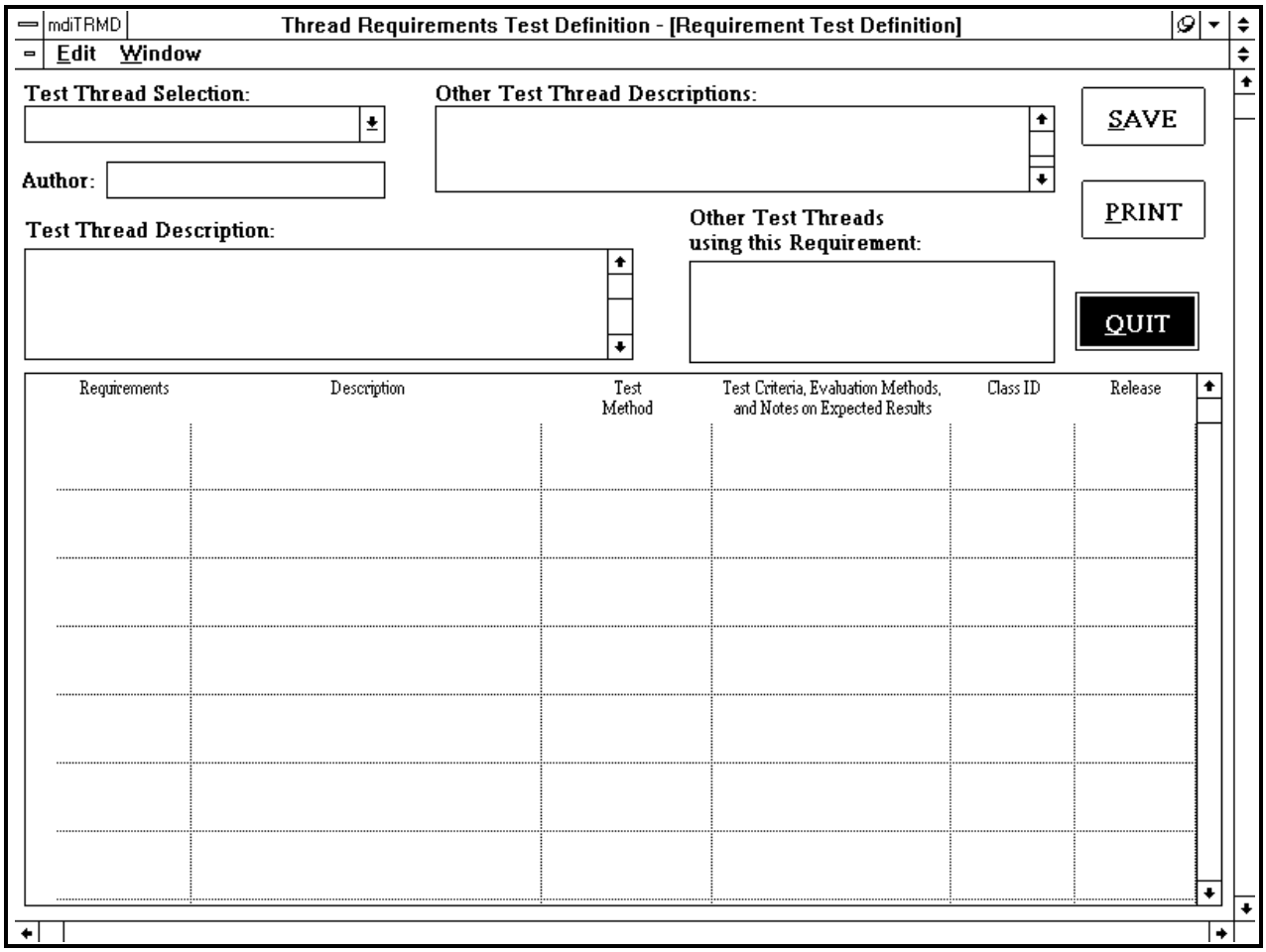

Exhibit 4.4.2-11 TMDB Requirement Test Definition Screen

4.4.2.11 TMDB Test Case Support Screen

The objective of this screen is to develop test cases associated with the already defined Functional Test Threads. The initial action is to select a functional test thread. When this is accomplished, the associated thread description appears along with all of the requirements collected for this test thread. If there are any test cases already associated with this thread, they are presented when selecting the down arrow in the Test Case ID field box. If a new test case is being developed, this same box is a data entry field. If any test case is selected then all of the fields associated with this test case are displayed. Otherwise, the analyst must manually populate them. Requirements associated with the test thread that must be mapped to this test case can be selected and dragged/dropped from the "Test Thread Requirements Box" to the "Test Case Requirements Box". Depress and hold the left mouse key to select a requirement and move it to the test case requirements box. This actually only copies the requirement, not eliminating it from the thread box. Likewise, depress and hold the left mouse key when selecting a requirement in the test case box then dragging it away from the box removes this requirement from the test case collection. Also, double clicking achieves the same effect.

When editing any of the test case data entry fields, fields 7 through 11, a help window appears which overlays the first three fields. This help field is always visible when editing these fields unless the "Hide" button is depressed. This help window can be copied from and pasted to the respective input field box. There is also a help window that is activated at the bottom of the screen, it is always turned on.

Control can be moved from this screen to the Procedures screen by depressing the PROCS button. The test procedure fields is populated automatically from the current thread and test case selection.

The Clear button gives the analyst a clean screen to work with. If generic test cases are to be created here, the analyst must only change the test case ID and save it. Alternatively, a "Delete TC" button is provided to remove unwanted test cases selected in the Test Case ID field.

Control returns to the Activity Selection Screen, Section 4.4.2.3 when depressing QUIT.

FIELDS:

1. Test Thread
   This display field allows the user to select the Functional Test Thread. Clicking the down arrow presents all of the available test threads.
2. Test Thread Description
   This display field is populated when a Test Thread is selected in field 1.
3. Test Case ID
   This data entry field is enter the Test Case ID. Clicking the down arrow presents all of the available test cases associated with the selected test thread in field 1.

4. Test Case Description
   This data entry field is either populated by selecting a test case in field 3, or by data entry provided by the analyst.
5. Requirements Associated with this Functional Test Thread
   This display box is populated by selecting a test thread in field 1. Clicking on a displayed requirement presents a description of the requirement from the database. Depressing the “Close” tag, associated with the description box, hides this description field. Depressing and holding the mouse button with selecting a requirement permits the analyst to drop a requirement on the test case box. The reason is to collect a subset of the requirement associated with the test thread and map them to be tested with this test case.
6. Thread Requirement mapped to this Test Case
   This display box is populated by selecting a Test Case ID in field 3. Also, the analyst may populate this box by drag/drop of requirements from field 5. Requirements may be removed from this box by depressing and holding the left mouse button and then moving the requirement off screen. Double clicking on a selected requirement in this box also de-maps it from the test case.
7. Prerequisite Conditions
   This data entry box is populated by selecting a Test Case ID in field 3. When selecting this field, help appears at the foot of the screen and a ‘help’ window outline appears in the upper left corner of the screen. This help may be hidden by depressing “Hide”. Material from this help window may be cut and pasted into this Prerequisite Conditions field.
8. Test Inputs
   This data entry box is populated by selecting a Test Case ID in field 3. When selecting this field, help appears at the foot of the screen and a ‘help’ window outline appears in the upper left corner of the screen. This help may be hidden by depressing “Hide”. Material from this help window may be cut and pasted into this Test Inputs field.
9. Expected Test Results
   This data entry box is populated by selecting a Test Case ID in field 3. When selecting this field, help appears at the foot of the screen and a ‘help’ window outline appears in the upper left corner of the screen. This help may be hidden by depressing “Hide”. Material from this help window may be cut and pasted into this Expected Test Results field.
10. Methods for Results Analysis
    This data entry box is populated by selecting a Test Case ID in field 3. When selecting this field, help appears at the foot of the screen and a ‘help’ window outline appears in the upper left corner of the screen. This help may be hidden by depressing “Hide”. Material from this help window may be cut and pasted into this Methods for Results Analysis field.
11. Assumptions and Constraints
    This data entry box is populated by selecting a Test Case ID in field 3. When selecting this field, help appears at the foot of the screen and a ‘help’ window outline appears in the upper left corner of the screen. This help may be hidden by depressing “Hide”.

Material from this help window may be cut and pasted into this Assumptions and Constraints field.

12. Help Outline Field - Normally Hidden
    This display field appears when focus is placed on field 7 through 11. This field may be “re-hidden” by depressing the associated “Hide” button. Copy operations may be performed from this field window to fields 7 through 11 as required.
13. Requirement Description - Normally Hidden
    This display field appears when a requirement is selected (clicked on) from the Test Thread requirements box. This field may be ‘re-hidden’ by depressing the “Close” button associated with this field.

BUTTONS:

1. SAVE (ALT - S)
   This button saves all current data associated with this Test Case.
2. PROCS (ALT - P)
   This button is a shortcut to the Test Procedure Development Screen. When entering with a selected test thread and test case, all windows in the procedure development screen are automatically populated.
3. CLEAR (ALT - C)
   This button clears all selections and entries from the screen.
4. Delete TC (ALT - D)
   This is a maintenance button permitting the analyst owner or someone with a lower access control number to delete a selected test case highlighted in field 3.
5. QUIT (ALT - Q)
   The QUIT button closes this screen and returns the analyst to Activity Selection Screen, Section 4.4.2.3.
6. Hide - Normally Hidden
   This Hide button appears when fields 7 through 11 are in focus and the help field appears on the screen. Depressing this button hides the help window and this button.
7. Close - Normally Hidden
   This Close button appears when a requirement is selected from the Test Thread Requirements box. Depressing this button hides the requirement description field and this button

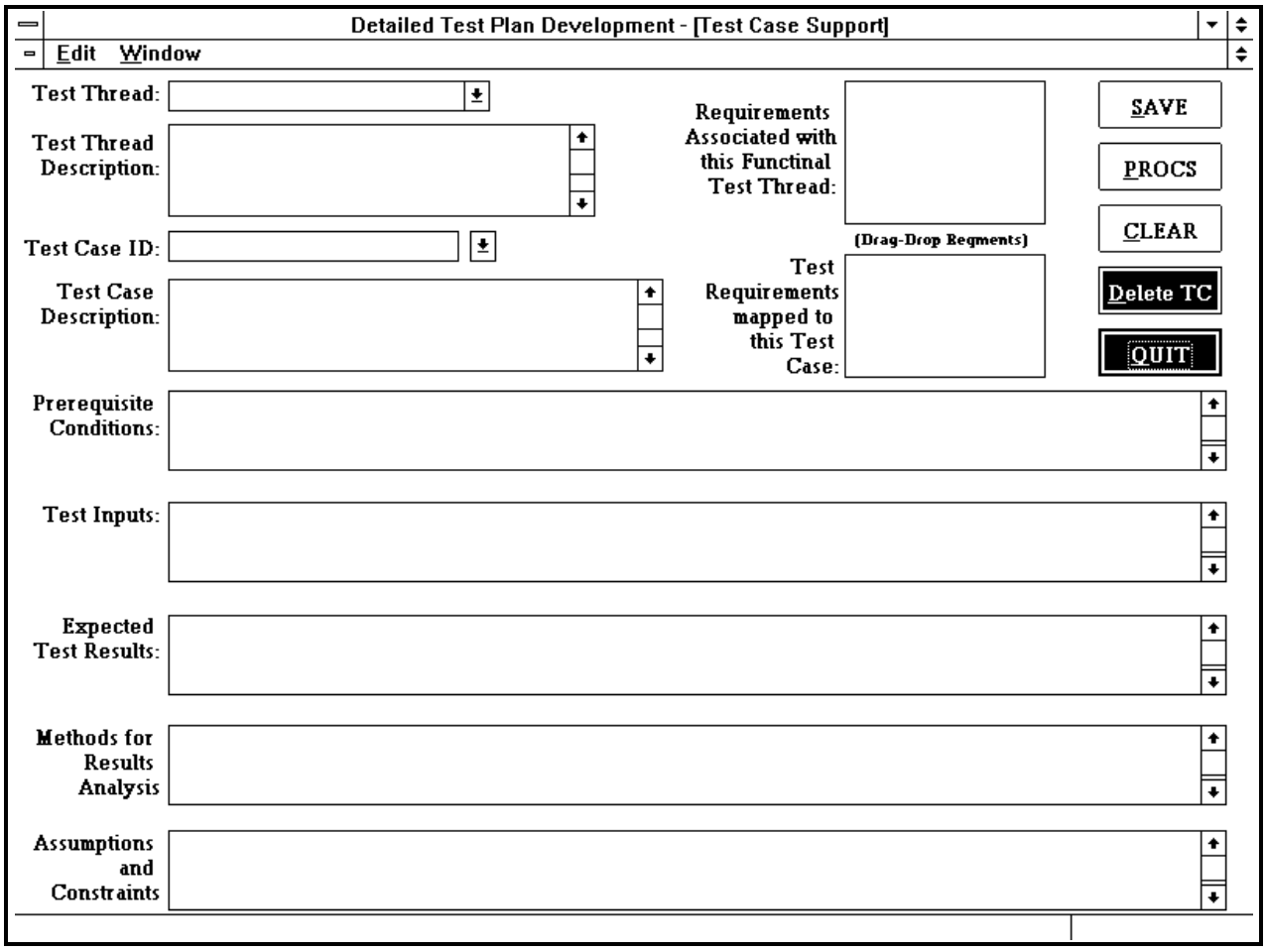

Exhibit 4.4.2-12 TMDB Test Case Support Screen

4.4.2.12 TMDB Test Procedure Support Screen

The purpose of the Test Procedure Support Screen is to prepare procedures for each selected test case within a selected test thread. This screen permits the creation and subsequent update of procedure steps and the mapping of of test case associated requirements to the procedure step level. For a new set of procedures, after selecting the test thread and test case, the descriptions and the requirements associated with the test case is populated. For existing test procedures, the rest of the associated fields are populated to the extent saved from a prior data entry/update session. If no procedure steps exist the application inserts the first procedure step. Subsequent inserts must be made for each new step. Also, the ability exists with the before and after buttons to insert a step before or after the current row. The Delete button permits the mark for deletion of any row. The Reset button clears any delete flags. For each step a requirement can be selected from the Requirements Box and drag/dropped onto the Addressed Requirements field of each row. The proper row must be selected prior to drag/drop. To perform the drag/drop, depress and hold the left mouse button on the desired requirement. When the focus icon appears move it to the pre-selected Addressed Requirements cell.

Help is available for table fields and the two data fields at the bottom in the form of a help window that appears when focus is on one of these data entry fields. To close this help window press the associated Hide button. Also, at the bottom of the screen is a prompter to tell the analyst what is expected for the selected field.

Control returns to the Test Case Support screen if that is how the user got here, or to the Activity Selection Screen, Section 4.4.2.3 when depressing QUIT.

FIELDS:

1. Test Thread ID
   This display field presents the analyst the available Test Threads when the down arrow is depressed. Selecting a Test Thread populates the description box and focuses on the Test Case ID field.
2. Test Thread Description
   This display field populates when a Test Thread is selected from field 1. It displays the description for the saved Test Thread.
3. Requirements
   This display field displays the requirements associated with the selected Test Case ID in field 4. These requirements are to be mapped to procedure steps within this test case. To perform the drag/drop, depress and hold the mouse on the desired requirement until the focus icon appears. Then drag this requirement to the preselected row requirement field.
4. Test Case ID
   This display field presents the analyst the available Test Case ID when the down arrow is depressed. Selecting a Test Case ID populates the description box and the associated requirements box. Also, if this is an existing procedure with steps, the last saved version of that is loaded onto the screen. If there are not steps, a first procedure step (row) is inserted for the user. Subsequent rows must be inserted by the user, either before or after

the current row with the use of the Insert row button and the Before and After radio buttons.

5. Test Case Description
   This display field populates when a Test Case ID is selected from Field 4. This field displays the Test Case description.
6. Procedure Steps - Table Column
   This data entry field populates when a Test Case ID is selected from Field 4. Otherwise, for new procedures the application automatically inserts the first record allowing input. Subsequent steps must be manually inserted using the Insert button, and the Before/After radio buttons.
7. Test Operator Actions and Equipment Operation - Table Column
   This data entry field populates when a Test Case ID is selected from Field 4. This field contains applicable descriptive text pertaining to test operator actions and equipment operation. Some help for this field appears in the upper left help window which may be closed with the associated Hide button.
8. Expected Result and Evaluation Criteria - Table Column
   This data entry field populates when a Test Case ID is selected from Field 4. This field contains applicable descriptive text pertaining to the expected test results and associated evaluation criteria. Some help for this field appears in the upper left help window which may be closed with the associated Hide button.
9. Addressed Requirements - Table Column
   This data entry field populates when a Test Case ID is selected from Field 4. Requirements are mapped to this field via a drag/drop process from the Requirements box, field 3. Placing the cursor over the selected requirement in the Requirements box, depressing the left mouse button and holding it in place till the focus icon appears, then moving it to the preselected row and releasing the mouse button deposits the requirement where desired. This field holds currently about 1 requirement.
10. Actions Required After Program Stop or Indicated Error
    This data entry field populates when a Test Case ID is selected from Field 4. Help is also available for this field in the associated help window. Descriptive text is not associated with any particular step but to the test case as a whole.
11. Procedures for Reducing and Analyzing Test Results
    This data entry field populates when a Test Case ID is selected from Field 4. Help is also available for this field in the associated help window. Descriptive text is not associated with any particular step but to the test case as a whole.

BUTTONS:

1. `Insert` (ALT - I)
   This button inserts rows into the Procedures table. Depressing this button inserts a row before or after the current row depending on the Before/After toggle button.
2. `Reset` (ALT - R)
   This button resets all of the delete flags selected by the Delete Button.
3. `Delete` (ALT - D)
   This button marks any selected row deleted. Prompting is included to avert any accidental invocation.

4. SAVE (ALT - S)
   This button saves the displayed procedure data from the table and Field 10 and Field 11.
5. CLEAR (ALT - C)
   This button clears the screen of any field data.
6. QUIT (ALT - Q)
   This button closes this screen and returns control to the Test Case Support screen if that is where this screen was activated. Otherwise, control returns to the Activity Selection Screen, Section 4.4.2.3.
7. Before and After - Toggle
   This toggle button informs the Insert button to insert a new row before or after the current row.

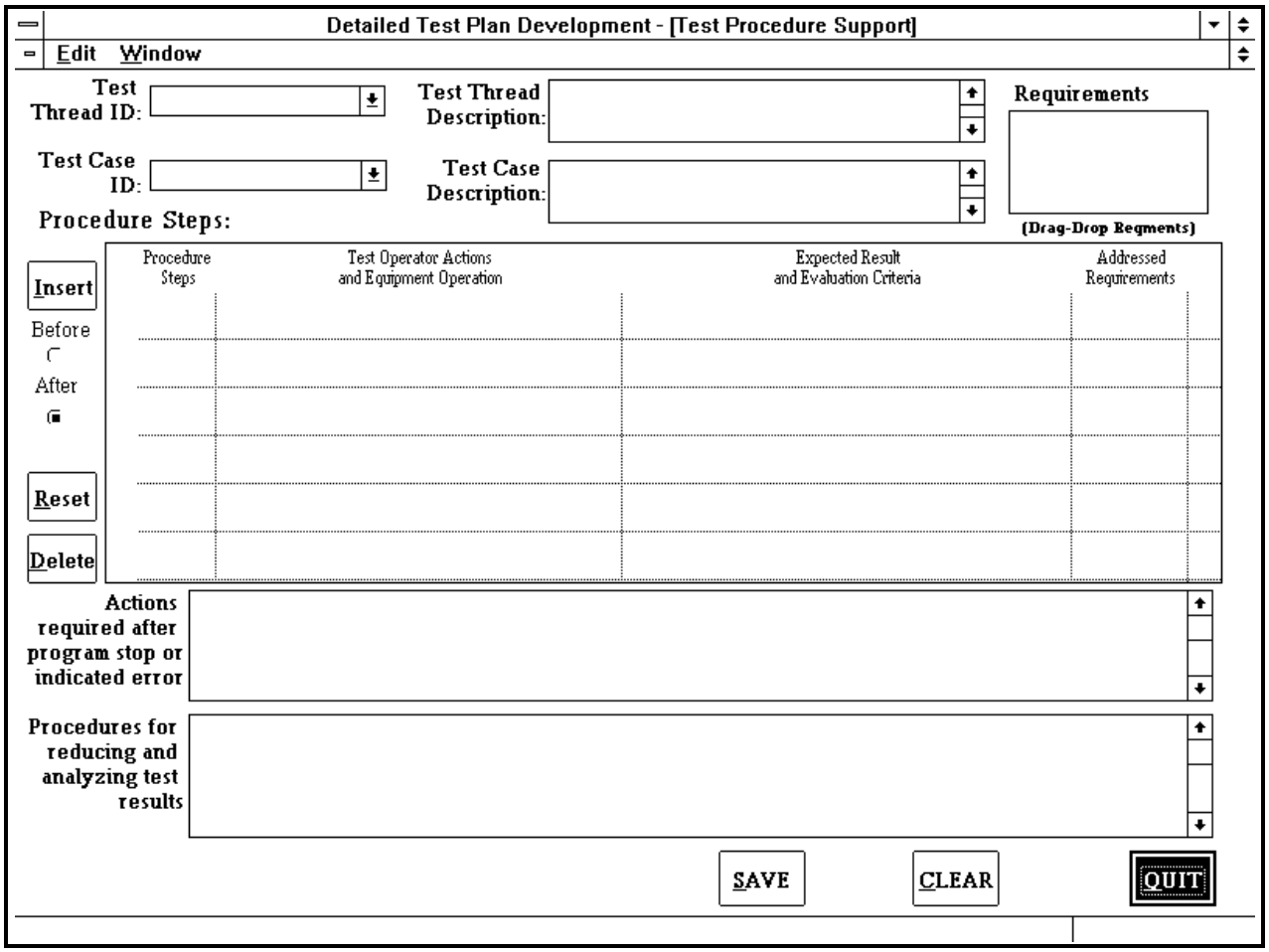

Exhibit 4.4.2-13 TMDB Test Procedure Support Screen

4.4.2.13 TMDB Test Resource Scheduling Screen

The purpose of the Test Resource Scheduling Screen is to develop the depict the resources needed to perform a test session. The test session can extend from part of one day to several weeks and consist of one to several test cases. This screen is very preliminary and presents basically a “strawman” for the analysts to start with. When specific inputs are collected and evaluated the final screen is documented.

As it stands this screen allows the maintenance of test sessions with the Test Session ID data entry field and the Del Session button. Initially, an analyst creates a test session using some accepted naming convention. If a session exists and is opened for update the session data is loaded to the screen. Otherwise, the analyst must data entry everything.

New selections can be added to: the Select Locations, the Select Hardware, the Select Software, and the Select Input Data fields. The desired field entry is entered into the (New Field Entry) box and the (Edit Field Category) is selected, i.e., one of the above. Then depress the Add button to add it. To remove a given field entry, simply select that entry and depress Remove. These 4 fields and the Select Test Cases field are all multiple select boxes.

The Time Constraints box permits entry of the Earliest and Latest Start dates along with the Expected Duration of the session being designed. The field on the bottom of the screen was included to permit any miscellaneous session notes needed to be presented.

This Test Session Data when completed is passed on to the Test Session Coordinator. The coordinator is collecting all of the test session requests and laying out a master schedule, based on resources available, to schedule all of the analysts test sessions.

When the Quit button is depressed, control returns to the Activity Selection Screen, Section 4.4.2.3.

FIELDS:

1. Test Session Identifier
   This data entry field permits the analyst to start the design of a new test session, or prompts the system to load the screen from an already existing test session. Available selections are viewed by depressing the adjacent down arrow and selecting a test session.
2. Session Author
   This data entry field is populated by selecting a test session ID in field 1. The down arrow presents some available test personnel. Any name can be entered however.
3. New Field Entry
   This data entry field supports the Location, Hardware, Software, and Input Data “Select” boxes. Any elements needed to be added to the four Selection lists can be entered here and added with a Add button after selecting a category from the selection box to the right, Field 4.

4. Edit Field Category
   This box allows the analyst to select which field category the data entered in the Field Entry field updates. This selection is performed prior to depressing the Add button.
5. Earliest Start Date
   This data entry field is populated by selecting a test session ID in field 1.
6. Latest Start Date
   This data entry field is populated by selecting a test session ID in field 1.
7. Expected Duration
   This data entry field is populated by selecting a test session ID in field 1.
8. Select Test Cases
   This field presents a list of currently saved test cases. The user can select the test cases to be included in this test session. If a previously saved test session is being updated, the previously selected test cases are already selected or highlighted.
9. Select Locations
   This field presents a list of currently saved test locations. The user can select the test locations to be included in this test session. If a previously saved test session is being updated, the previously selected test locations are already selected or highlighted.
10. Select Hardware
    This field presents a list of currently saved test hardware. The user can select the test hardware needed for this test session. If a previously saved test session is being updated, the previously selected test hardware items are already selected or highlighted.
11. Select Software
    This field presents a list of currently saved test software. The user can select the test software needed for this test session. If a previously saved test session is being updated, the previously selected test software items are already selected or highlighted.
12. Select Input Data
    This field presents a list of currently saved test input data. The user can select the test input data needed for this test session. If a previously saved test session is being updated, the previously selected test input data are already selected or highlighted.
13. Session Notes
    This data entry field is populated by selecting a test session ID in field 1.

BUTTONS:

1. Add
   This button is used in support of the (New Field Entry) field, Field 3 and the (Edit Field Category) field, Field 4. The new field entry in Field 3 is added to the selected field category in Field 4.
2. Remove
   This button removes any field selected in the Locations, Hardware, Software, or Input Data fields.
3. SAVE (ALT - S)
   This button saves the developed Test Session with all its associated information.

4. PRINT (ALT - P)
   This button prints the selected test session data to either file or printer. If printing to file be sure to select the generic text print driver.
5. CLEAR (ALT - C)
   This button clears the screen of all entered data.
6. Del Session
   This button deletes any selected test session in field 1.
7. QUIT (ALT - Q)
   This button closes this application and returns control to Activity Selection Screen, Section 4.4.2.3.

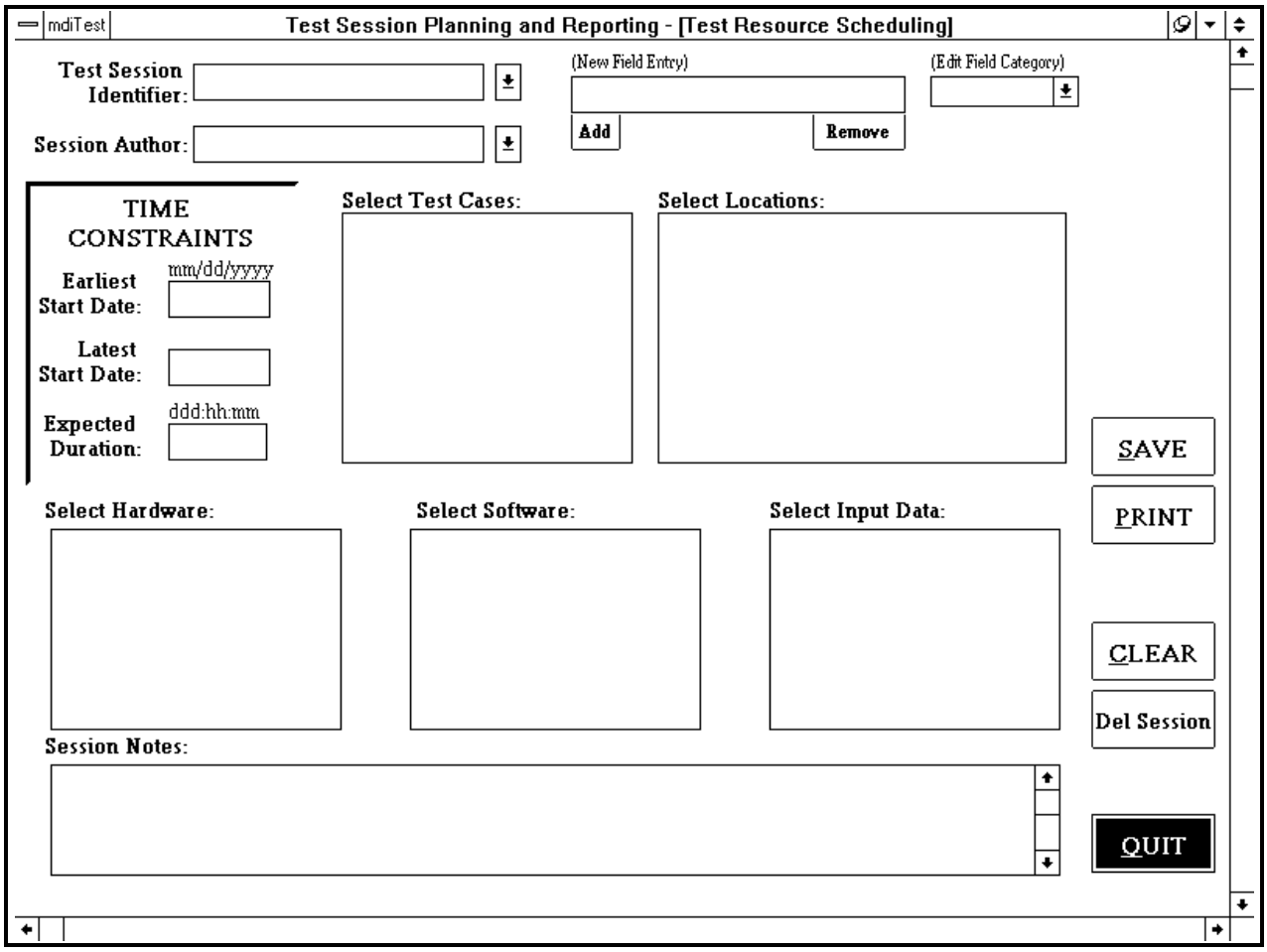

Exhibit 4.4.2-14 TMDB Test Resource Scheduling Screen

4.4.2.14 TMDB Test Session Reporting Screen

The purpose of the Session Reporting Screen is to lead the analyst step by step through the session's test case procedure steps. At the same time providing a means to capture the actual results, perform a foreground analysis, and record a pass/fail judgment.

This activity begins by selecting a Test Session ID which populates the Test Case ID box. When a Test Case is selected the screen is populated with the previously saved test procedures and associated preparatory data. The start and end dates are those provided on the session planner, and may need to be changed. The tester for this session may be different than originally provided also.

The ability to review the Location, Hardware, Software, and Input data selections is made possible by depressing the respective buttons.

As the session progresses data is entered and at the end of the day, a Daily test report can be submitted electronically by depressing the Daily button. Shortly after the session is completed, a Flash report can be submitted by depressing the Flash button. After the final test report is ready to accept the test case results, the test report appendices can be provided by depressing Formal.

Control returns to the Activity Selection Screen, refer to section 4.4.2.3 when the QUIT button is depressed.

FIELDS:

1. Test Session ID
   This field allows the test conductor to select the Test Session ID to be conducted. The selections are provided by depressing the down arrow adjacent to the field. This populates the last modified date field along with the Start and End date and the Tester.
2. Last Modified
   This display field is populated when a Test Session ID in Field 1 is selected. This date reflects the last date this session was opened.
3. Test Case ID
   This field is populated when a Test Session ID in Field 1 is selected. This field allows the test conductor to select the Test Case ID.
4. Start Date
   This field is populated when a Test Session ID in Field 1 is selected. The Start Date field is initially loaded from the original test session but may be modified as needed.
5. End Date
   This field is populated when a Test Session ID in Field 1 is selected. The End Date field is initially loaded from the original test session but may be modified as needed.
6. Test Case Description
   This display field is populated when a Test Case ID in Field 3 is selected. This field displays the saved Test Case Description.

7. Tester
   This field is populated when a Test Session ID in Field 1 is selected. The field is populated from the original test session but may be changed. The down arrow to the right displays a selection of test personnel.
8. Procedure Steps - Table Column
   This display field is populated when a Test Case ID in Field 3 is selected. The Procedures are those saved from the Test Procedure Support Screen.
9. Test Operator Actions and Equipment Operation - Table Column
   This display field is populated when a Test Case ID in Field 3 is selected. The Procedures are those saved from the Test Procedure Support Screen. This field instructs the tester on how to proceed with the step.
10. Expected Result and Evaluation Criteria - Table Column
    This display field is populated when a Test Case ID in Field 3 is selected. The Procedures are those saved from the Test Procedure Support Screen. This field instructs the tester on what to expect and how to evaluate the results in order to render a pass/fail judgment.
11. Actual Results - Table Column
    This field provides a field for the tester to record their actual results.
12. Analysis of Results vs. Expected
    This field provides a field for the tester to record the analysis of the actual results using the evaluation criteria if Field 10.
13. Pass/Fail
    This field provides a field for the tester to record a P or F, P for pass and F for fail.

BUTTONS:

1. `Daily` (ALT - D)
   This button closes this screen and launches the Daily Test Activity Report Screen, Section 3.7.2.15.
2. `Flash` (ALT - F)
   This button closes this screen and launches the Flash Test Session Report Screen, Section 3.7.2.16.
3. `Formal` (ALT - M)
   This button closes this screen and launches the Formal Test Report Screen, Section 3.7.2.17.
4. `Locations`(ALT - L)
   This button brings up and hides a small window identifying the Locations selected for this test session.
5. `Hardware` (ALT - H)
   This button brings up and hides a small window identifying the Hardware selected for this test session.
6. `Software` (ALT - W)
   This button brings up and hides a small window identifying the Software selected for this test session.

7. Input Data (ALT - I)
   This button brings up and hides a small window identifying the Input Data selected for this test session.
8. CLEAR (ALT - C)
   This button clears all data fields on this screen.
9. SAVE (ALT - S)
   This button saves all data fields on this screen.
10. QUIT (ALT - Q)
    This button closes this application and return control to Activity Selection Screen, Section 4.4.2.3.

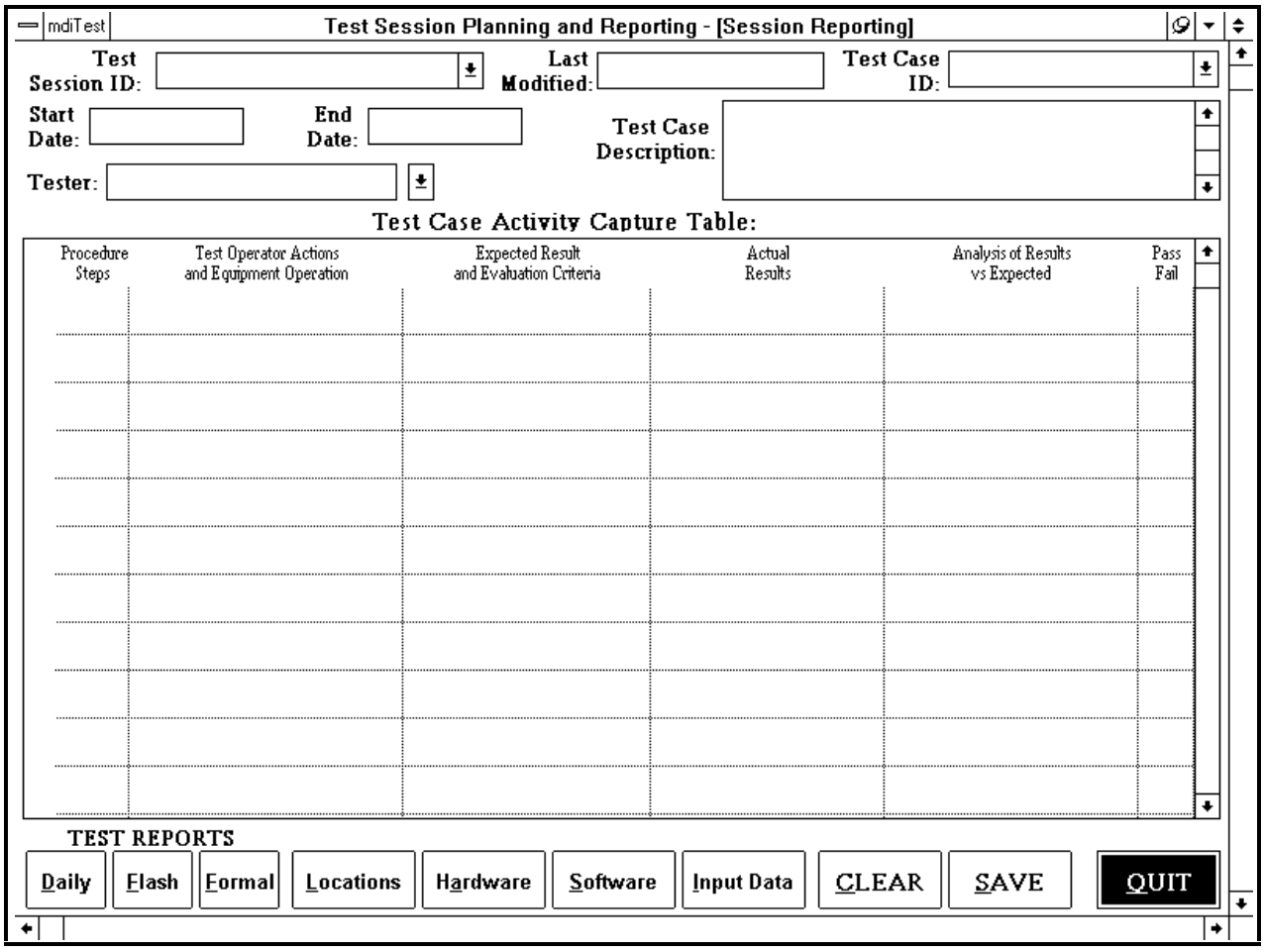

Exhibit 4.4.2-15 TMDB Session Reporting Screen

4.4.2.15 TMDB Daily Test Activity Report Screen

This screen is activated by the Test Session Reporting Screen, Section 4.4.2.14. The purpose of this screen is to provide a means for the test conductor to broadcast daily test session activity reports. If there is nothing in the activity report already, then a template loads into the report. This template is a boilerplate to lend some conformity to the reporting format. This activity report once completed at the end of the day, can be e-mailed by depressing the MAIL button. Also the report can be printed by depressing the PRINT button. All of the data fields can be cleared by depressing the CLEAR button.

When the QUIT button is depressed control returns to the Test Session Reporting Screen, Section 4.4.2.14.

FIELDS:

1. Test Conductor
   This data entry field contains the name of the test conductor. It would be populated if a Test Session ID was used when selecting the Daily Activity Report from screen 4.4.2.14.
2. To
   This multiple select box contains the people that are to receive this Daily Activity Report. Select each person to receive the Report.
3. Subject
   This data entry subject field is automatically loaded with a default Subject if this is a new Activity Report. This subject field is editable. If a subject was previously saved, it is returned.
4. Date
   This is the date field and contains the current date, always.
5. Test Session ID
   This data entry field contains the Test Session ID. It would be populated if a Test Session ID was used when selecting the Daily Activity Report from screen 4.4.2.14. Otherwise depress the right down arrow to display a selection of Test Session IDs to choose from.
6. DAILY Test Activity Report
   This data entry field contains the Daily Activity Report. If a Report for this session was previously saved, this field contains those contents. Otherwise, if this is a new Daily Activity Report, then a pre-formatted report appears as a guide.

BUTTONS:

1. SAVE (ALT - S)
   This button saves the data entry fields for this Test Session Daily Activity Report to the database.
2. MAIL (ALT - M)
   This button activates a mail application. A Login screen appears and then a activity screen appears. At this point, the test conductor may modify the subject, the report,

choose the Option button to get a receipt and set the priority. Also present is an attachment button to include attachment with this transmittal. When completed, depress the send button and the report is sent.

3. PRINT (ALT - P)
   This button prints the daily activity report or sends it to file. The default format is dependent upon what driver the printer is using. For legibility or printing to a file, use a generic text driver.
4. CLEAR (ALT - C)
   This button clears all of the data entry fields on this screen.
5. QUIT (ALT - Q)
   This button closes the activity report screen and returns control to the Test Session Reporting Screen, 4.4.2.14.

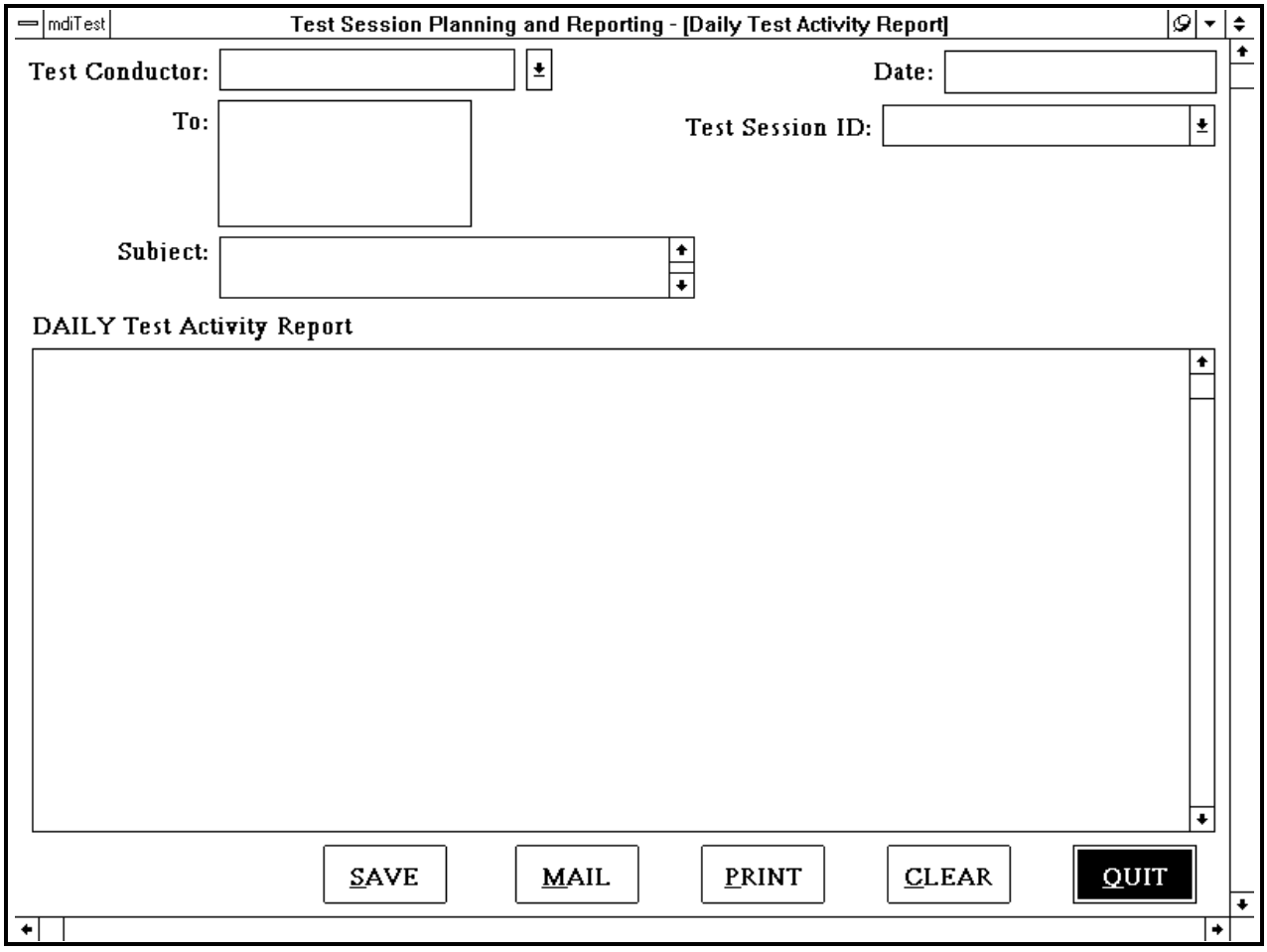

Exhibit 4.4.2-16 TMDB Daily Test Activity Report Screen

4.4.2.16 TMDB Flash Test Session Report Screen

This screen is activated by the Test Session Reporting Screen, Section 4.4.2.14. The purpose of this screen is to provide a means for the test conductor or analyst to develop a flash Test Session Report. The format of this Flash Report is still undecided. The format conforms to a Contractor TAM format, but, the specifics have not been decided upon. This Report can be printed by depressing the PRINT button. All of the data fields can be cleared by depressing the CLEAR button.

The TEST CONFIGURATION section contains only the selected Hardware, Software and Data Files. The next section contains the highlights of the entire test session. And, the final section contains the conclusions. What probably needs to be included are the test cases executed and some metrics about pass/fail. Also, perhaps which requirements were tested, were not tested, or that may need retested.

When the QUIT button is depressed control returns to the Test Session Reporting Screen, Section 4.4.2.14.

FIELDS:

1. Test Session ID
   This field contains the Test Session ID selected from the Test Session Report screen. If none selected, then the test conductor can depress the right down arrow to display a list of test session IDs to choose from.
2. DTP Author
   This data entry field contains the author of the Detailed Test Plan or the test conductor.
3. Date
   This field contains the current date, always.
4. Hardware Selected
   This field contains the Hardware selected when the Test Session was being planned, Section 4.4.2.13.
5. Software Selected
   This field contains the Software selected when the Test Session was being planned, Section 4.4.2.13.
6. Data Files Selected
   This field contains the Input Data Files selected when the Test Session was being planned, Section 4.4.2.13.
7. Reported Session Highlights
   This window contains highlights reported from the Daily Activity Reports
8. Your Conclusions
   This window contains the test conductors or DTP authors conclusions/observations about the test session. Some comments about subsequent planning may be included here to initiate the development of subsequent test sessions if necessary.

BUTTONS:

1. SAVE (ALT - S)
   This button saves all of the data entry fields on this screen.
2. PRINT (ALT - P)
   This button prints all of the data entry fields on this screen.
3. QUIT (ALT - Q)
   This button closes the current screen and return control to the Test Session Reporting Screen, section 4.4.2.14.

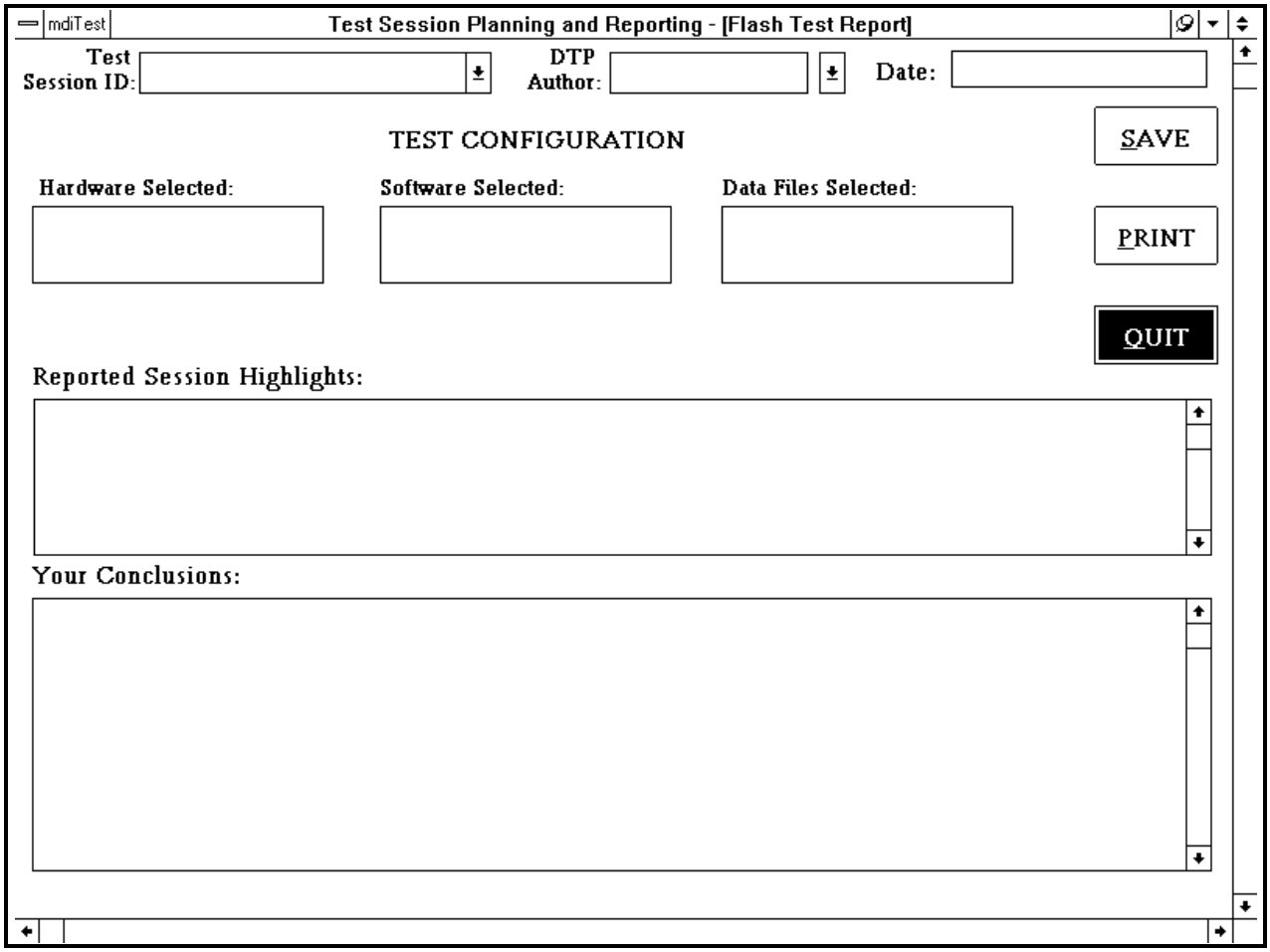

Exhibit 4.4.2-17 TMDB Flash Test Session Report Screen

4.4.2.17 TMDB Formal Test Report Screen

This screen is currently activated by the Test Session Reporting Screen, Section 4.4.2.14. The purpose of this screen is to provide a means for the test conductor or analyst to prepare material from the data base targeted for the appendices of the Formal Test Report. The format of this Formal Test Report is still vague. This Report can be printed by depressing the PRINT button. All of the data fields can be cleared by depressing the CLEAR button.

The first section displays the Executive Summary window. This window is intended for a thumbnail overview of the success/failure of the testing associated with this Test Thread.

The TEST CONFIGURATION section contains only the selected Hardware, Software, Data Files and an Environmental Summary window. The next section contains a summary of the capabilities successfully demonstrated, significant failures, and untested capabilities. This presentation is tentative. The objective of this screen is to aid in preparing the contents of the Formal Test Report, not the Formal Test Report. In other words, pumping out the contents of the data base as it pertains to the test thread under test.

When the QUIT button is depressed control returns to the Test Session Reporting Screen, Section 4.4.2.14.

FIELDS:

1. Test Thread
   This field contains the Test Thread being reported. The right down arrow displays a list of all of the available Test Thread IDs.
2. DTP Author
   This data entry field contains the name of the Detailed Test Plan Author.
3. Date
   This field contains the current date, always.
4. Executive Summary
   This field contains the executive summary of testing associated with this particular Test Thread.
5. Hardware Selected
   Summary of the hardware selected for testing this Thread.
6. Software Selected
   Summary of the Software selected for testing this Thread.
7. Data Files Selected
   Summary of the Input Data Files selected for testing this Thread.
8. Environmental Summary
   Summary of the testing environment for the testing of this Thread.
9. Capabilities Successfully Demonstrated/Significant Failures/Untested Capabilities
   This field is intended to present the success/failure of testing performed. It also is intended to identify further testing needed.

BUTTONS:

1. SAVE (ALT - S)
   This button saves all of the data entry fields associated with this test session.
2. PRINT (ALT - P)
   This button prints all of the data entry fields.
3. QUIT (ALT - Q)
   When this button is depressed, control returns to the Test Session Reporting Screen, refer to section 4.4.2.14.

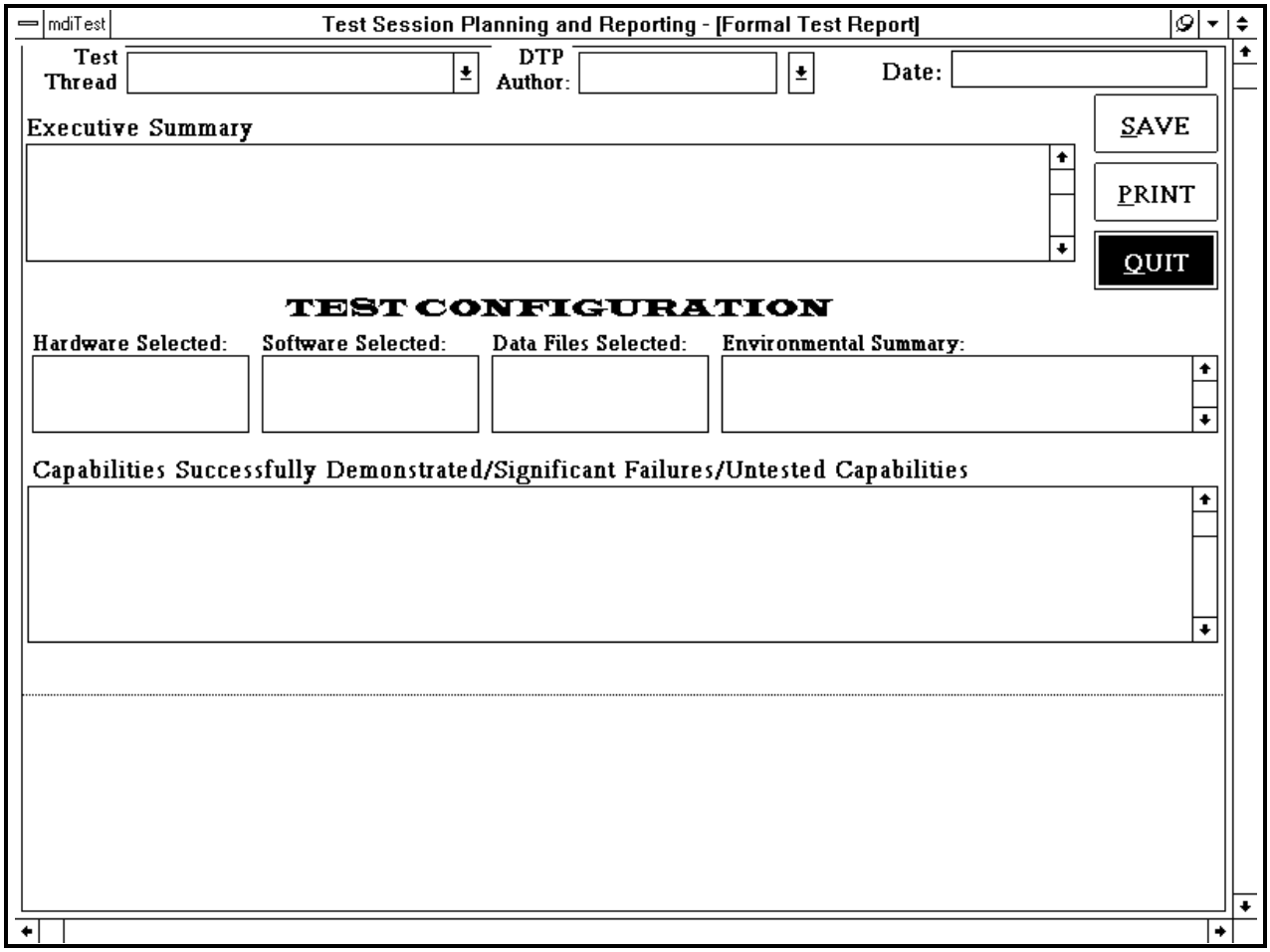

Exhibit 4.4.2-18 TMDB Formal Test Session Report Screen

4.4.2.18 TMDB Personnel Locator Screen

The purpose for this screen is to aid the analyst in finding out information about people affiliated with the program. This file contains: last and first name, phone, e-mail, FAX and phone number, title, company/organization, and location. The file may be searched for any one of these fields and a search window displayed. The Reset button returns the entire table.

The table is fully maintainable with the ability to add records, delete or undelete records, and with the use of the Reset button, discard all of the edits. The Apply Edits button is the same as a Save button.

When this application is closed with the QUIT button, control is returned to the Activity Selection Screen, section 4.4.2.4.

FIELDS:

1. Last Name
   This data entry field contains the Last Name of the person to be used for searching or adding to the database.
2. First Name
   This data entry field contains the First Name of the person to be used for searching or adding to the database.
3. Phone
   This data entry field contains the Phone number of this person to be used for searching or adding to the database.
4. E-Mail
   This data entry field contains the E-Mail address of this person to be used for searching or adding to the database.
5. FAX
   This data entry field contains the FAX number of this person to be used for searching or adding to the database.
6. Title
   This data entry field contains the title or responsibility of this person to be used for searching or adding to the database.
7. Organization
   This data entry field contains the company/organization of this person to be used for searching or adding to the database.
8. Location
   This data entry field contains the geographic or functional location of the person to be used for searching or adding to the database.
9. LAST NAME - Table Column
   This display field contains the last name of the person.
10. FIRST NAME - Table Column
    This display field contains the first name of the person.

11. PHONE - Table Column
    This display field contains the phone number of the person.
12. E-MAIL - Table Column
    This display field contains the E-Mail address of the person.
13. FAX - Table Column
    This display field contains the FAX number of the person.
14. TITLE - Table Column
    This display field contains the title/responsibility of the person.
15. ORGANIZATION - Table Column - Scroll Right
    This display field contains the Organization/Company of the person.
16. LOCATION - Table Column - Scroll Right
    This display field contains the geographic or functional location of the person.

BUTTONS:

1. `Search` (ALT - S)
   This button implements a search of the personnel database based on the contents of the non-tabular fields on this screen.
2. `Add Record` (ALT - R)
   This button adds a record to the database containing the information in the non-tabular fields on this screen.
3. `Delete` (ALT - D)
   This button deletes a selected person from the database.
4. `Undelete` (ALT - U)
   This button reverses the operation of button 3.
5. `Apply Edits` (ALT - A)
   This button applies all edits to the database.
6. `Reset` (ALT - R)
   This button returns the database to the full personnel mode subsequent to a search being performed.
7. `Quit` (ALT - Q)
   This button closes this application and return control to the Activity Selection Screen, section 4.4.2.4.

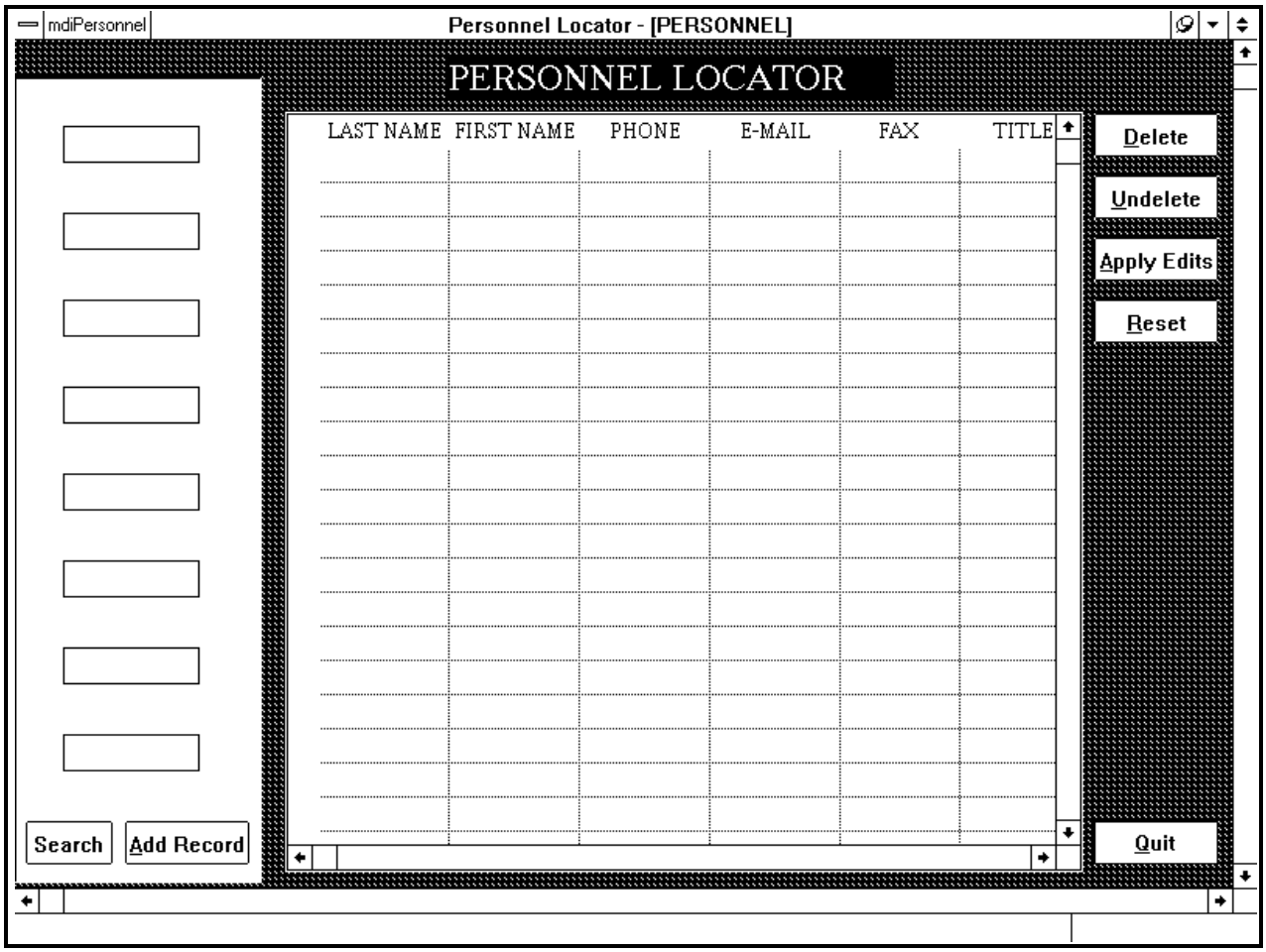

Exhibit 4.4.2-19 TMDB Personnel Locator Screen

4.4.3 TMDB Messages

4.4.3.1 Informational Messages

TBS

4.4.3.2 Warning Messages

TBS

4.4.3.3 Error Messages

TBS

4.5 RTM-TO-ISE Application

The Purpose of the RTM-TO-ISE tool is to replicate a specific release, generally the latest, of the requirements and their associated data elements from the Oracle database which is used by the RTM application to the Sybase which is used by the TMDB tool. The Oracle database is a bundled product and as such is a read only product, nor does RTM easily allow data queries to its underlying database structures.

Each screen of the RTM-TO-ISE tool presents an analysis task to be performed on a separate field brought across to the ISE database. Initially the two databases' requirements must be aligned. Each database must have the same requirements. The RTM contains requirements that have been superseded, replaced, deleted, etc. The ISE database that TMDB uses will only contain the current requirements to enhance productivity, i.e., record count. The analysis performed to align the current requirements will identify requirements that are to be removed from or added to the ISE database. If more information is needed on a specific requirement being removed from the ISE, the RTM can be accessed off-line to make that inquiry.

Several screens are used to make the various field analyses because RTM/Oracle stores the data in so many different tables with keys, etc. The ISE data is all in one table making life much simpler. The queries into Oracle are quite long and cannot easily be connected to analyze all the fields at the same time. This operation needs only to be done when a new release is performed.

Recently, Hughes has been making schema changes to their database. Each change must be evaluated for impact to the structure of the RTM-TO-ISE since it must be able to read Oracle correctly. Also, any enhancements made to the schema of the RTM must be taken advantage of in the ISE side. The ISE database must remain stable and downward compatible hence another need for this RTM-TO-ISE tool, to isolate changes to the TMDB tool.

4.5.1 RTM-TO-ISE Installation and Startup

The RTM-TO-ISE application requires remote access to both an Oracle database maintained by the RTM tool and a Sybase database where the requirements data is stored. In order to connect to these remote databases, network connectivity software is used. Open Client is used to connect to Sybase. SQLNet is used to connect to Oracle. These products must be installed on the client machine before the RTM-TO-ISE executable software is loaded. See Appendix A for detailed instructions on Open Client installation. See Appendix B for detailed instructions on SQLNet installation.

Once the connectivity software is installed and tested a C:\RTM2ISE subdirectory should be created on the client machine. In this subdirectory is placed: a copy of the executable code, the necessary report files, and the deployment files supplied by Gupta for SQLWindows applications. See Appendix C for a listing of these files.

4.5.2 RTM-TO-ISE Graphical User Interface

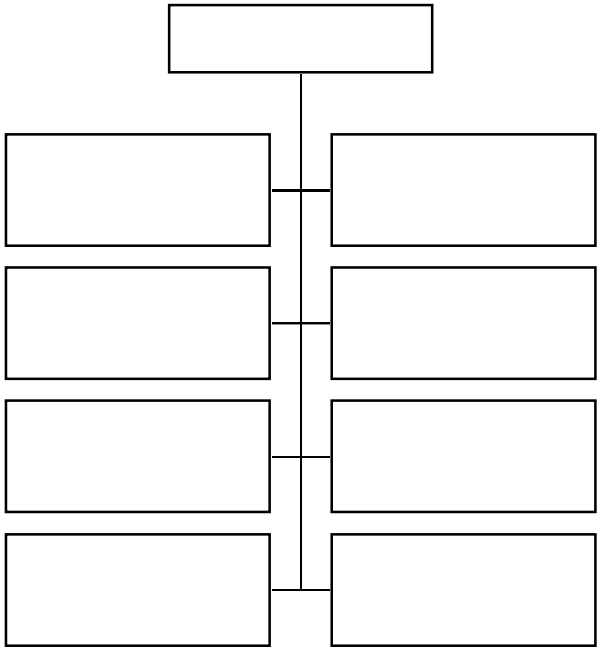

Exhibit 4.5.2-1 RTM-TO-ISE Menu Hierarchy

Exhibit 4.5.2-1 represents the hierarchy of menu choices presented in using the RTM-TO-ISE. The following subsections detail the user interface design for the RTM-TO-ISE.

4.5.2.1 RTM-TO-ISE Login Screen

FIELDS:

1. RTM/Oracle Version
   This data entry field allows the user to select a specific version stored on the Sun Server under the Oracle RTM database. Also, if the right down arrow is clicked, it displays a list of the current available versions.
2. ISE/Sybase Username
   This data entry field captures the Username for logging into the Sybase ISE database.
3. ISE/Sybase Password
   This data entry field captures the Password for logging into the Sybase ISE database.

BUTTONS:

1. LOGIN (ALT - L)
   This button initiates the Login sequence to both the Oracle and ISE databases.
2. EXIT (ALT - X)
   This button is used to close the RTM-TO-ISE application without logging in.

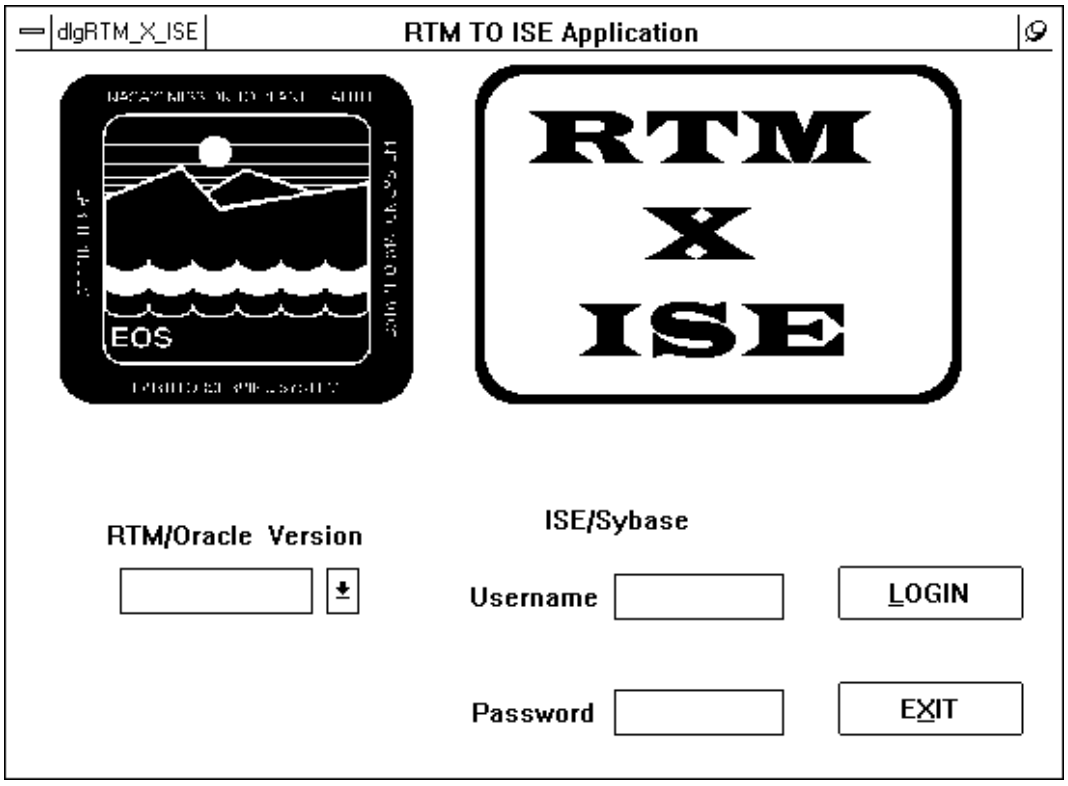

Exhibit 4.5.2-2 RTM-TO-ISE Login Screen

4.5.2.2 RTM-TO-ISE Toolbar

This is the toolbar for the RTM-To-ISE application. This toolbar is visible at all times within all screens. All of the various screens can be launched at any time from this toolbar. The various analysis tasks to be launched, in the typical order of invocation are:

REQ - Requirements Analysis Task
CLARIFY - Clarification Text Analysis Task
RELEASE - Release Analysis Task
TYPE - Type Analysis Task
STATUS - Status Analysis Task
SEGMENT - Segment Analysis Task
SOURCE - Source Interface Analysis Task
DESTINATION - Destination Interface Analysis Task
ISE VERSION - ISE Database Version Stamp Task

Depressing the EXIT button on this screen terminates the RTM-To-ISE application.

FIELDS:

1. ISE Release Date
   This display field presents the current Sybase ISE Release Date. This date complies with the ISE date stamp of the most recently saved database. Multiple versions of this database are not saved on-line. This field is updated if the ISE VERSION button is depressed.
2. RTM Release Date
   This display field presents the currently selected Oracle RTM Release Date. Oracle currently retains all releases submitted by Hughes. Note that the ISE and RTM database must match due to the generation of multiple schemas spawned by the Hughes developers. Typically the latest RTM release is the proper selection.

BUTTONS:

1. REQ
   This button initiates a task which compares a specific Oracle RTM database with a specific Sybase ISE database. The analysis includes the capability to identify deleted requirements, inserted requirements, updates to the requirement description text field or Class ID field.
2. CLARIFY
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the clarification text field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
3. RELEASE
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The

comparison identifies any changes made to the requirement's release field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.

4. TYPE
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the requirement's type field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
5. STATUS
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the requirement's status field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
6. SEGMENT
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the requirement's segment field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
7. SOURCE
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the requirements source interface field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
8. DESTINATION
   This button initiates a task which compares a specific Oracle RTM database requirement record with a specific Sybase ISE database requirement record. The comparison identifies any changes made to the requirements destination interface field associated with the selected requirement. Each requirement is selected by the unique combination of a requirements record key and its associated Class ID.
9. ISE VERSION
   This button allows the user to place a current date/time stamp on the newly analyzed version of the Sybase ISE database.
10. EXIT
    This button terminates the RTM-TO-ISE application.

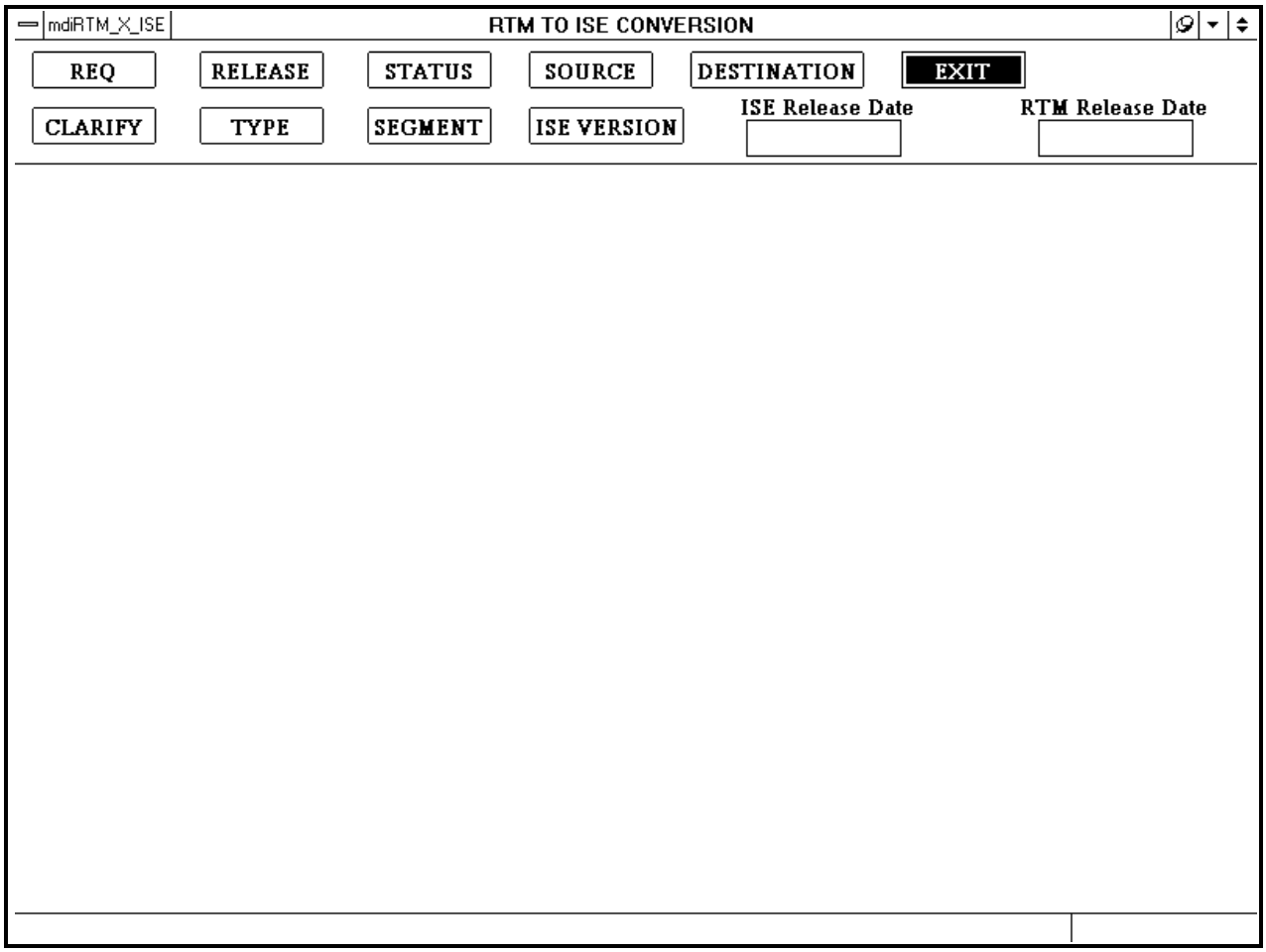

Exhibit 4.5.2-3 RTM-TO-ISE Toolbar

4.5.2.3 RTM-TO-ISE Requirements Analysis Screen

The Requirements Analysis Screen is the initial screen to invoke when a new Hughes RTM database is received. This task steps through each requirement and identifies if new classes have been inserted or deleted. The uniqueness for each requirement is defined by the Class ID and the Req Key fields.

When this task is invoked, the initial action that occurs autonomously is the loading of both the RTM and the ISE requirements to the child tables. These tables are a subset of all of the available fields, but these are the only fields pertinent to inserted or deleted records. The user may scan all of the records of either table as desired.

The first step is to analyze the selected databases. This is invoked by depressing the `Analyze` button. The user may view the operation, but it goes very rapidly and cannot be interrupted. The task may take 15 minutes or longer depending upon the number of database users and the users processor speed.

The appropriate display fields indicate the progress of the operation and a running summary of the results, i.e., number of deleted, inserted, or changed requirements. A timer is displayed in the bottom right corner to post the user on elapsed time since depressing the `Analyze` button.

When the analysis is completed, the user may view the Inserts, Deltas, or Deletes by depressing those respective buttons. These records are viewed in a notepad application which only holds 64k characters. If more space is needed to display results, Write or Word applications must be utilized. The respective text files have by this time been closed so the user can utilize these other viewers concurrently.

The final step in the analysis upon reviewing all inserts, deletions, and changes is to update the ISE database by depressing the `Update` button. This operation may take several minutes to update depending the extent of the updates to the database. The updates only affect the fields listed, i.e., Requirement ID, Class ID, and Text (inserts and deletes for Requirement/Class ID and changes for Text).

After this analysis is completed, the user proceeds to the next field analysis, i.e. `CLARIFY` , `RELEASE` , `TYPE` , `STATUS` , `SEGMENT` , `SOURCE` , or `DESTINATION` .

If another analysis task is not selected, then `EXIT` is depressed to terminate the application.

`FIELDS:`

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.

2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Rows
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Deletes
   This display field shows the current number of records in the SYBASE Child Table that are not in the RTM Child Table, i.e., records to be deleted to make the SYBASE Child Table to look like the RTM Child Table.
6. Inserts
   This display field shows the current number of records in the RTM Child Table that are not in the SYBASE Child Table, i.e., records to be inserted into the SYBASE Child Table to look like the RTM Child Table.
7. Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
8. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
9. Req ID (RTM Child Table Column)
   This display field shows the Requirement ID Title.
10. Class ID (RTM Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
11. Req Key (RTM Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Text (RTM Child Table Column)
    This display field shows the descriptive Text associated with a particular Requirement ID and Class ID.
13. Req ID (SYBASE Child Table Column)
    This display field shows the Requirement ID Title.
14. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
15. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

16. Text (SYBASE Child Table Column)
    This display field shows the descriptive Text associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the appropriate field, i.e., insert, delete, or delta.
2. View Inserts (ALT - I)
   This button brings up a window (NOTEPAD application) displaying the records that appear in the RTM Table but not in the SYBASE Table.
3. View Deltas (ALT - D)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
4. View Deletes (ALT - E)
   This button bring up a window (NOTEPAD application) displaying the records that appear in the SYBASE Table but not in the RTM Table.
5. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing inserts, deletes and changes.

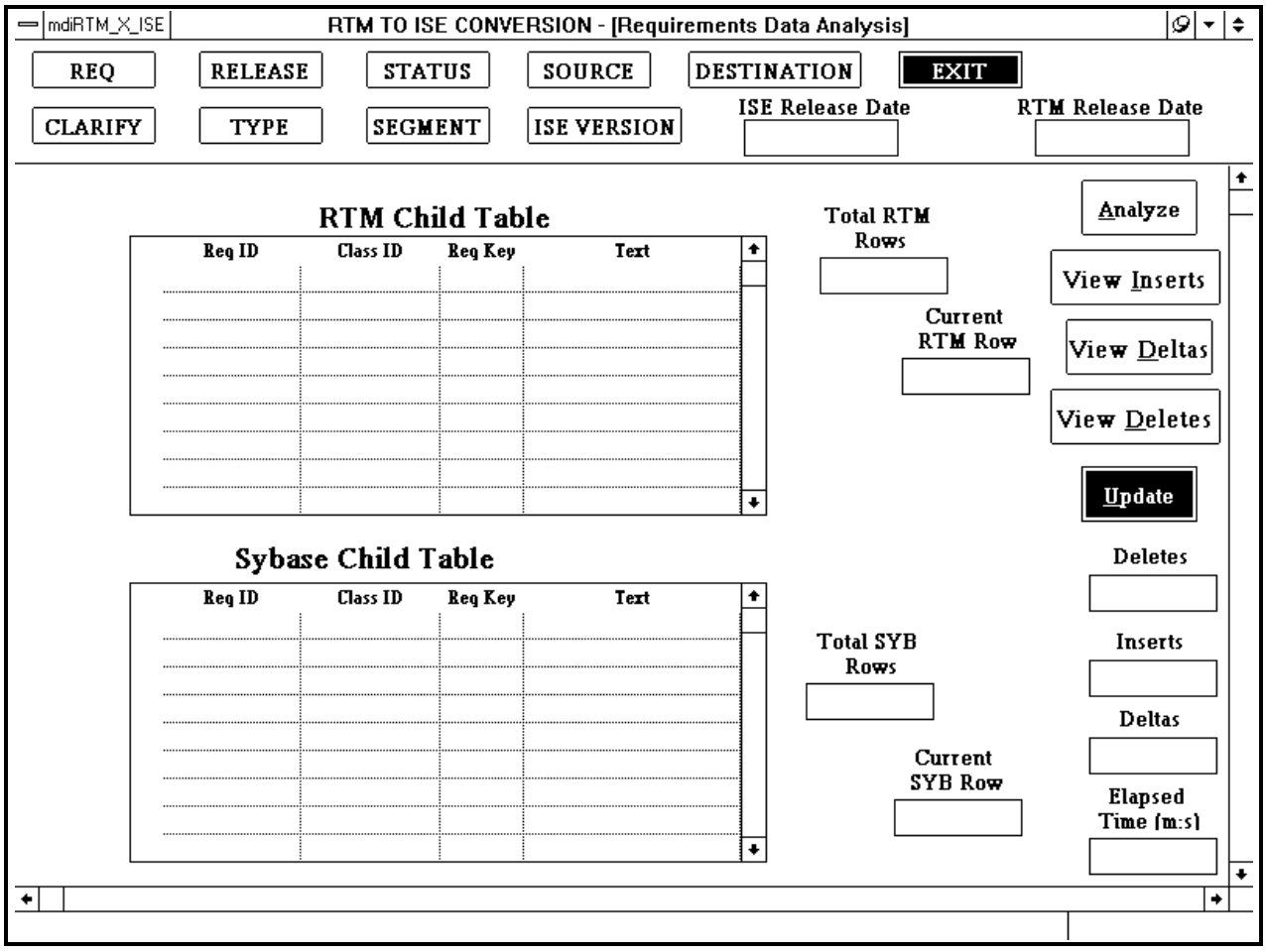

Exhibit 4.5.2-4 RTM-TO-ISE Requirements Analysis Screen

4.5.2.4 RTM-TO-ISE Clarification Text Analysis Screen

The Clarification Text Analysis task populates the two child tables, RTM and Sybase, with all of the clarification records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have clarification data associated with them.

If another analysis task from the toolbar is not selected, then EXIT is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Clarification Text (RTM Child Table Column)
   This display field shows the clarification Text associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Clarification Text (SYBASE Child Table Column)
    This display field shows the clarification Text associated with a particular Requirement ID and Class ID.

BUTTONS:

1. `Req_By_Rel` or `Level 2, 3, 4` (Radio Button)
   The clarification text for these two classes of requirements are located in different tables within the RTM database. As a result the loading, analysis, and update must be performed separately.
2. `Analyze` (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
3. `View Deltas` (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
4. `Update` (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

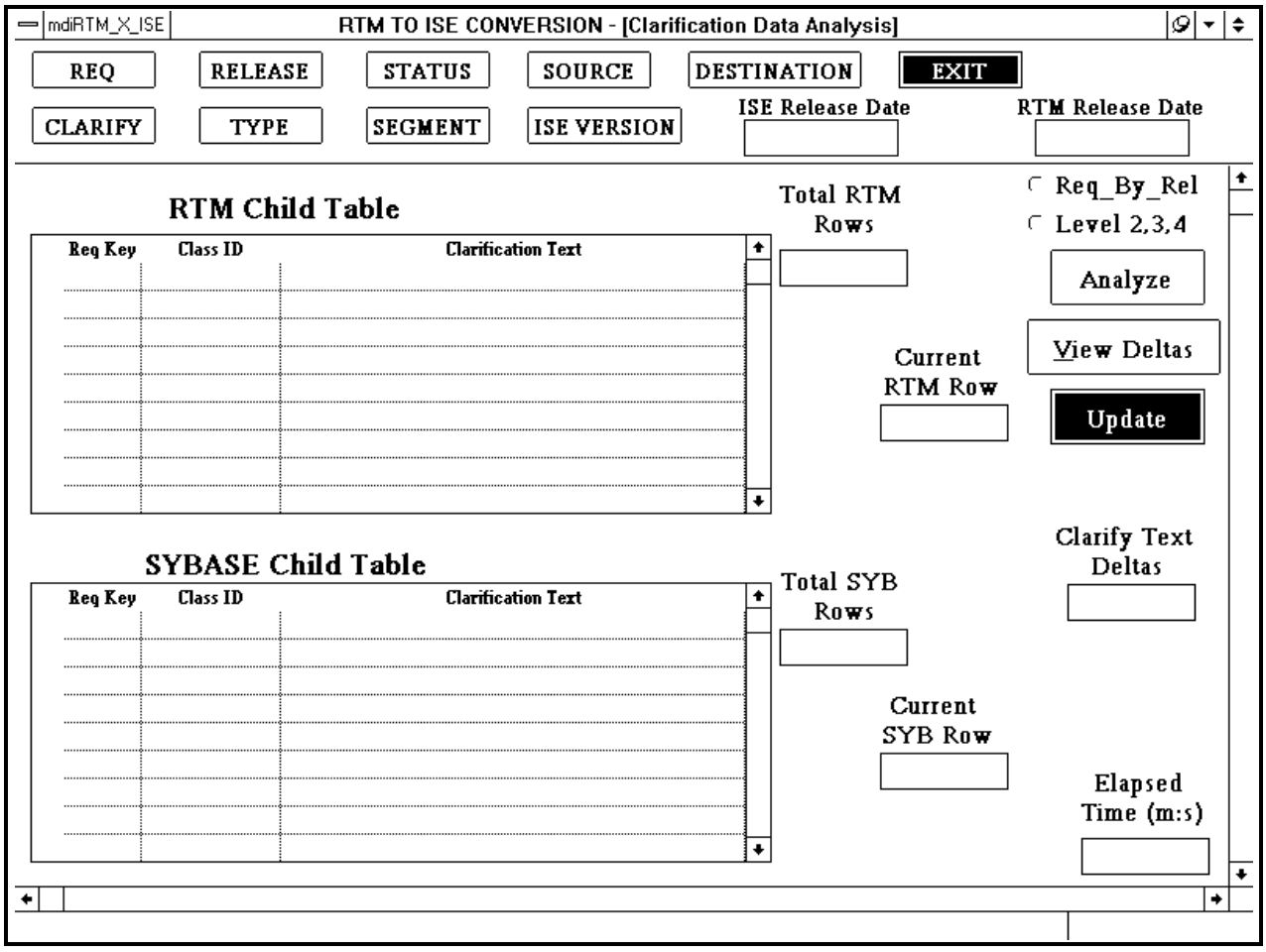

Exhibit 4.5.2.5 RTM-TO-ISE Clarification Text Analysis Screen

4.5.2.5 RTM-TO-ISE Release Analysis Screen

The Release Analysis task populates the two child tables, RTM and Sybase, with all of the Release associated records in each database. The Requirement Key and Class ID association is unique within the database. All requirements should have release data associated with them.

If another analysis task from the toolbar is not selected, then EXIT is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Release (RTM Child Table Column)
   This display field shows the release data associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Release (SYBASE Child Table Column)
    This display field shows the release data associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. View Deltas (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

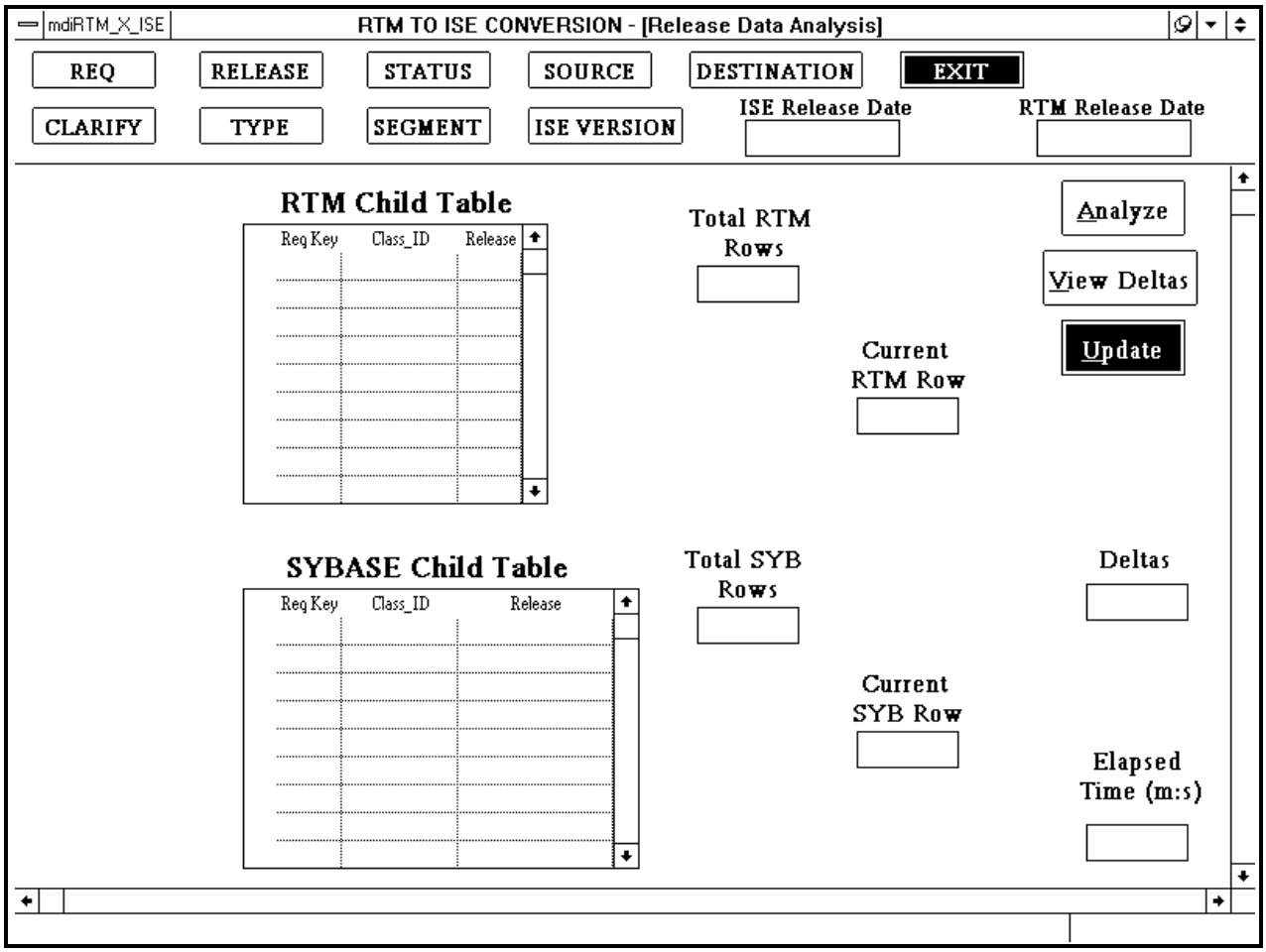

Exhibit 4.5.2.6 RTM-TO-ISE Release Analysis Screen

4.5.2.6 RTM-TO-ISE Requirement Type Analysis Screen

The Requirement Type Analysis task populates the two child tables, RTM and Sybase, with all of the Type associated records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have requirement Type data associated with them.

If another analysis task from the toolbar is not selected, then `EXIT` is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Type Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Type (RTM Child Table Column)
   This display field shows the requirement Type data associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Type (SYBASE Child Table Column)
    This display field shows the requirement Type data associated with a particular Requirement ID and Class ID.

BUTTONS:

1. `Analyze` (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. `View Deltas` (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. `Update` (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

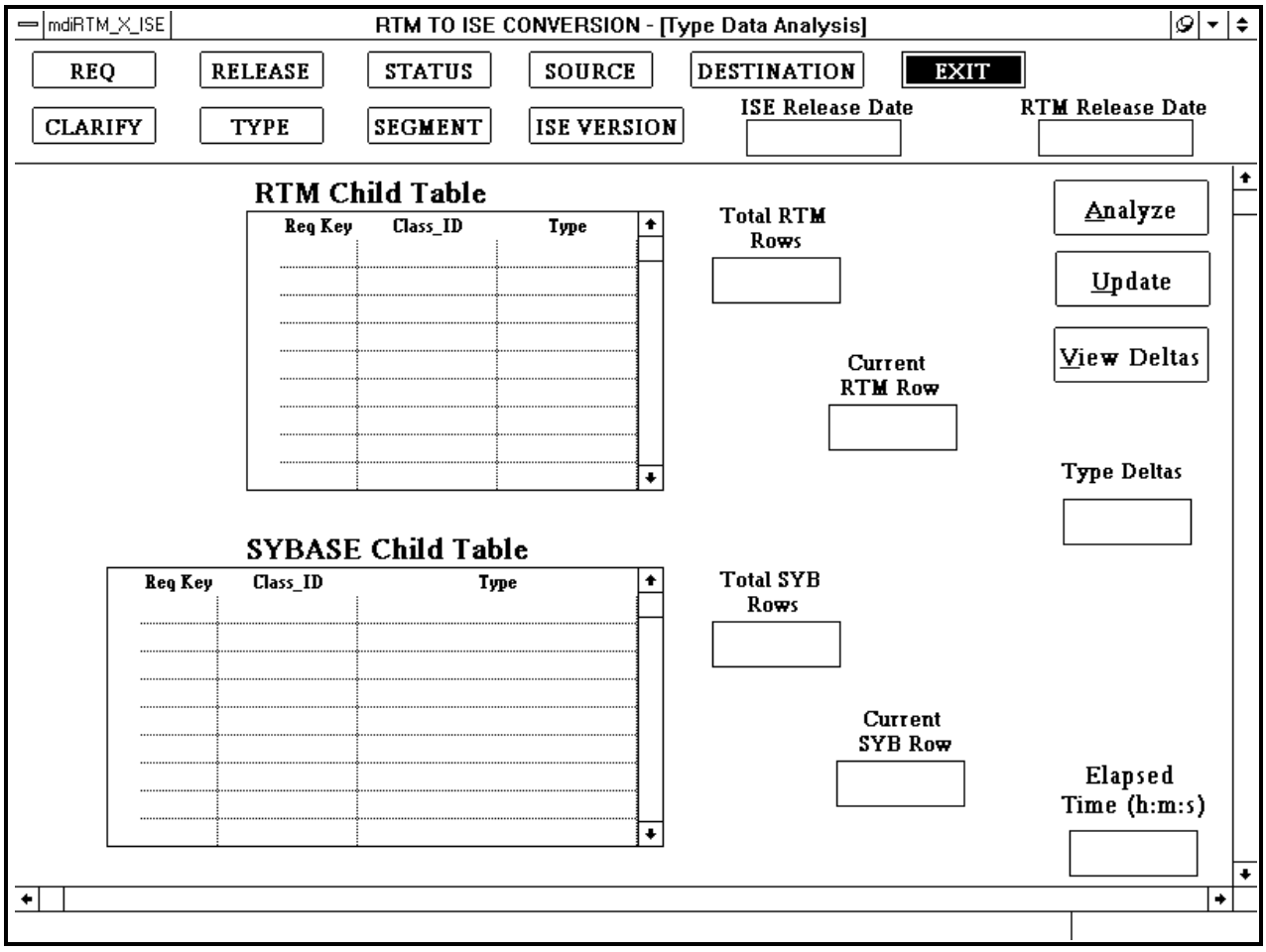

Exhibit 4.5.2.7 RTM-TO-ISE Requirement Type Analysis Screen

4.5.2.7 RTM-TO-ISE Requirement Status Analysis Screen

The Requirement Status Analysis task populates the two child tables, RTM and Sybase, with all of the Status data associated records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have requirement status data associated with them.

If another analysis task from the toolbar is not selected, then `EXIT` is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Status (RTM Child Table Column)
   This display field shows the requirement Status data associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Status (SYBASE Child Table Column)
    This display field shows the requirement Status data associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. View Deltas (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

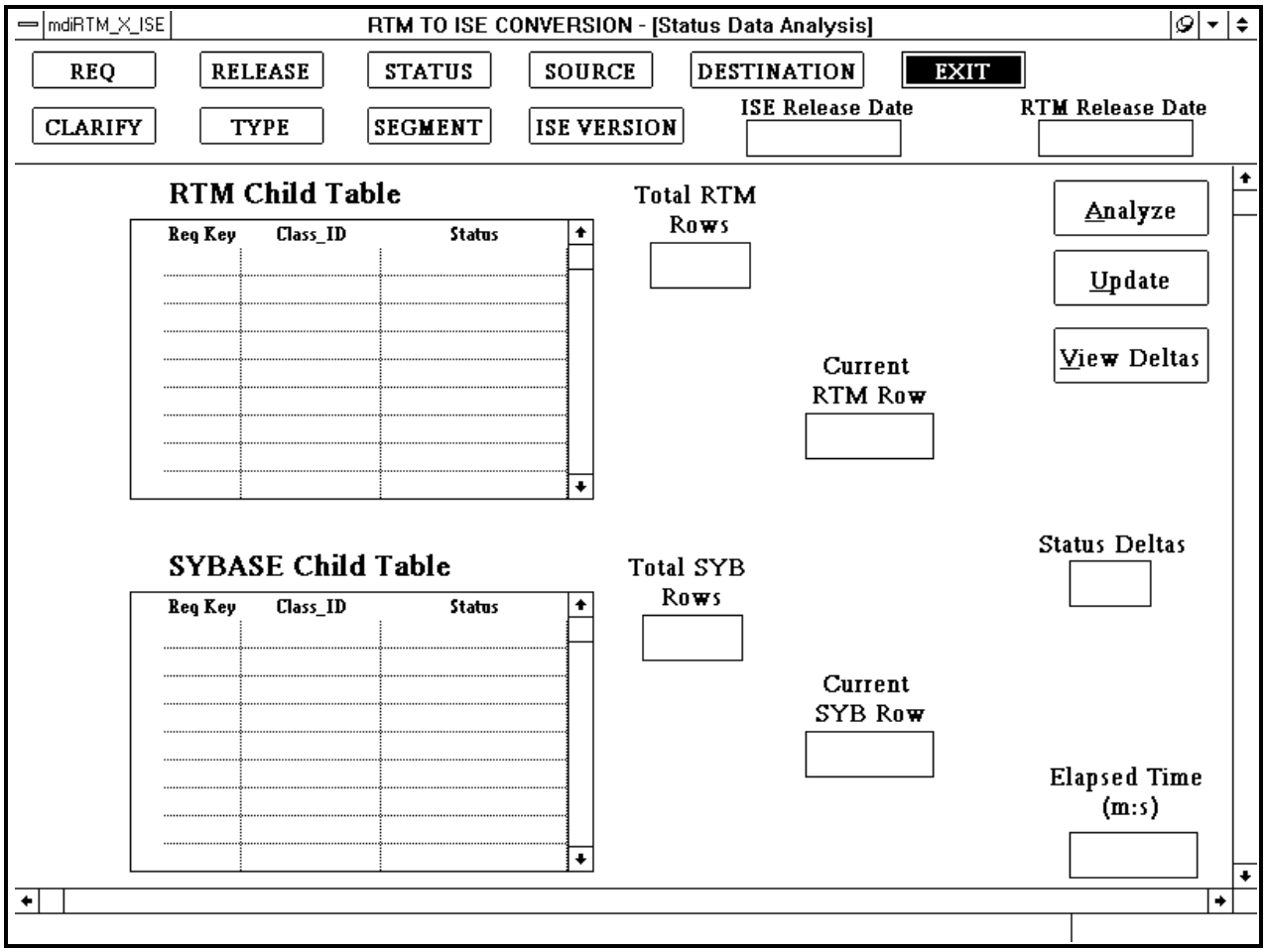

Exhibit 4.5.2-8 RTM-TO-ISE Requirement Status Analysis Screen

4.5.2.8 RTM-TO-ISE Segment Analysis Screen

The Requirement Segment Analysis task populates the two child tables, RTM and Sybase, with all of the Segment data associated records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have requirement segment data associated with them.

If another analysis task from the toolbar is not selected, then EXIT is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Release (RTM Child Table Column)
   This display field shows the clarification Text associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Release (SYBASE Child Table Column)
    This display field shows the clarification Text associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. View Deltas (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

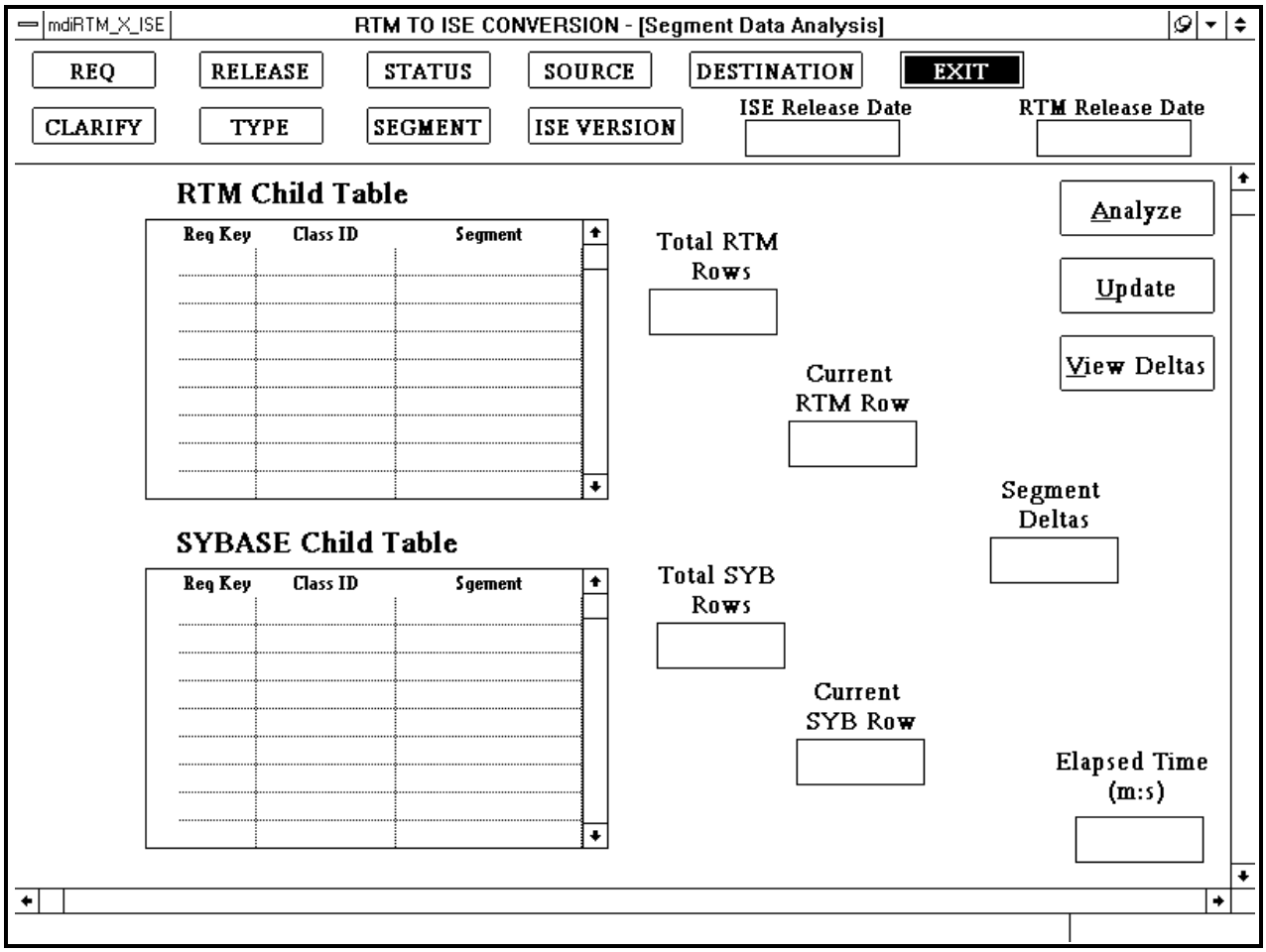

Exhibit 4.5.2-9 RTM-TO-ISE Segment Analysis Screen

4.5.2.9 RTM-TO-ISE Source Interface Analysis Screen

The Requirement Source Interface Analysis task populates the two child tables, RTM and Sybase, with all of the Source Interface data associated records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have requirement Source Interface data associated with them.

If another analysis task from the toolbar is not selected, then `EXIT` is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Source (RTM Child Table Column)
   This display field shows the requirement Source Interface data associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Source (SYBASE Child Table Column)
    This display field shows the requirement Source Interface data associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. View Deltas (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

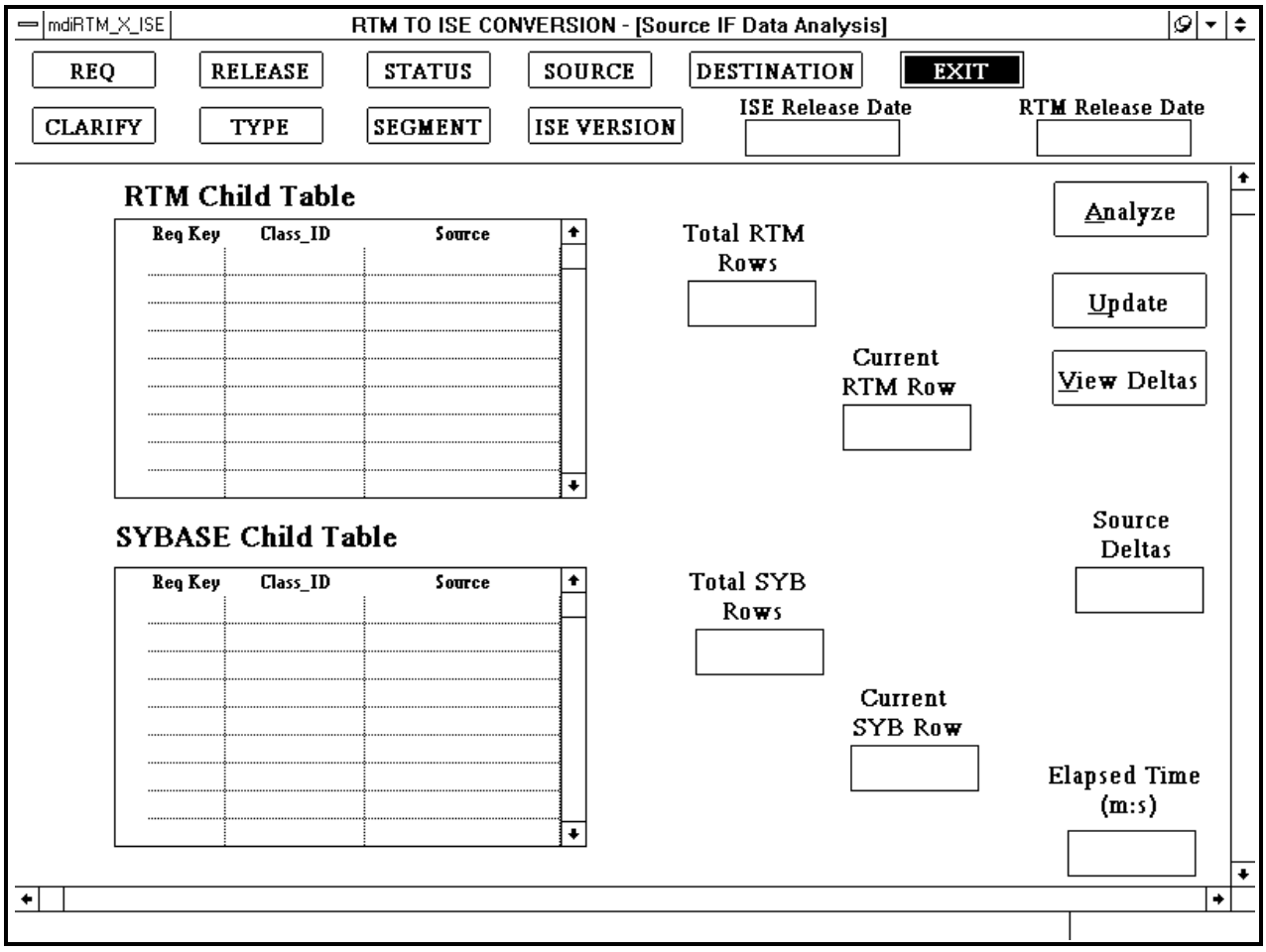

Exhibit 4.5.2-10 RTM-TO-ISE Source Interface Analysis Screen

4.5.2.10 RTM-TO-ISE Destination Interface Analysis Screen

The Requirement Destination Interface Analysis task populates the two child tables, RTM and Sybase, with all of the Destination Interface data associated records in each database. The Requirement Key and Class ID association is unique within the database. Not all requirements have requirement Destination Interface data associated with them.

If another analysis task from the toolbar is not selected, then `EXIT` is depressed to terminate the application.

FIELDS:

1. Total RTM Rows
   This display field shows the total number of records in the RTM Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the Oracle RTM Database, for the selected release.
2. Current RTM Row
   This display field shows the current RTM Child Table Row that is currently in focus, i.e., being analyzed.
3. Total SYB Rows
   This display field shows the total number of records in the SYBASE Child Table. For the requirements analysis, this is the total number of unique Requirement ID and Class ID combinations in the SYBASE ISE Database for the current release.
4. Current SYB Row
   This display field shows the current SYBASE Child Table Row that is currently in focus, i.e., being analyzed.
5. Clarify Text Deltas
   This display field shows the current number of records in the SYBASE Child Table that need to changed to replicate the RTM Child Table.
6. Elapsed Time (h:m:s)
   This display field shows the elapsed time when the analysis task has completed. The format is in (hours:minutes:seconds).
7. Req Key (RTM Child Table Column)
   This display field shows the Requirement Key associated with a particular requirement. Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
8. Class ID (RTM Child Table Column)
   This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
9. Destination (RTM Child Table Column)
   This display field shows the requirement Destination Interface data associated with a particular Requirement ID and Class ID.
10. Req Key (SYBASE Child Table Column)
    This display field shows the Requirement Key associated with a particular requirement.

Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.

11. Class ID (SYBASE Child Table Column)
    This display field shows the Class ID associated with a particular requirement Each Requirement ID can be associated with several Class IDs and for each Requirement Key there is one Requirement ID.
12. Release (SYBASE Child Table Column)
    This display field shows the requirement Destination Interface data associated with a particular Requirement ID and Class ID.

BUTTONS:

1. Analyze (ALT - A)
   This button initiates an analysis of the two tables, identifying any discrepancies and reporting them to the Delta field.
2. View Deltas (ALT - V)
   This button brings up a window (NOTEPAD application) displaying the records that differ between the SYBASE Table and the RTM Table.
3. Update (ALT - U)
   This button initiates an update of the SYBASE ISE database, performing the required changes.

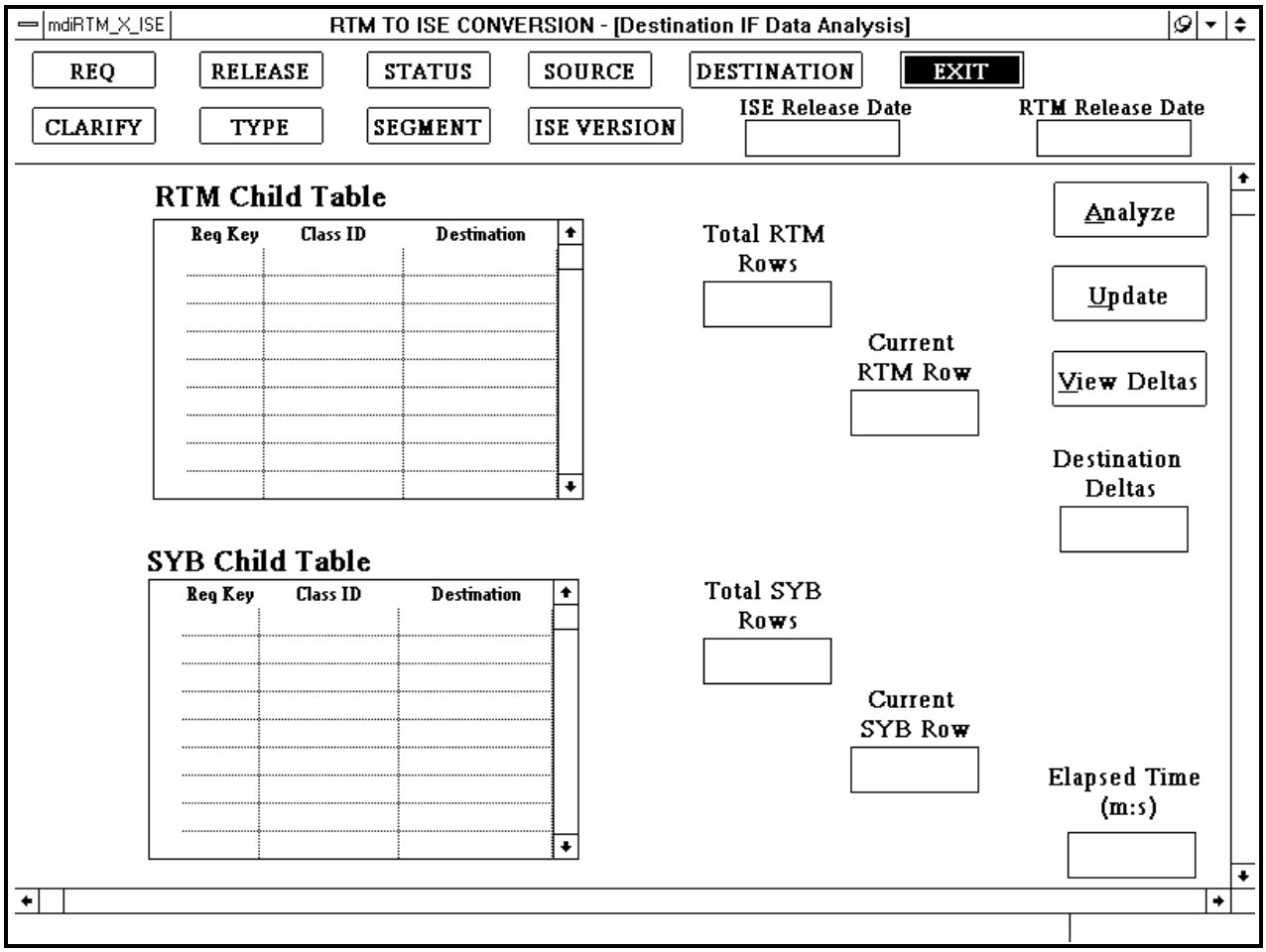

Exhibit 4.5.2-11 RTM-TO-ISE Destination Interface Analysis Screen

4.5.3 RTM-TO-ISE Messages

4.5.3.1 Informational Messages

TBS

4.5.3.2 Warning Messages

TBS

4.5.3.3 Error Messages

TBS

5. ABBREVIATIONS AND ACRONYMS

Below is a list of the abbreviations and acronyms used in this document.

ARDB	-	Automated Requirements Database
BONeS	-	Block Oriented Network Simulator
CGI	-	Common Gateway Interface
COTS	-	Commercial Off-The-Shelf
DBI	-	Data Browser Interface
DID	-	Data Item Description
DMDB	-	Data Management Database
EBnet	-	EOS Backbone Network
ECS	-	EOSDIS Core System
EDHS	-	ECS Data Handling System
EDOS	-	EOS Data and Operations System
EGS	-	EOS Ground System
EOS	-	Earth Observing System
EOSDIS	-	Earth Observing System Data Information System
ESDIS	-	Earth Science Data and Information System
FTP	-	File Transfer Protocol
GS	-	Ground System
GSFC	-	Goddard Space Flight Center
GUI	-	Graphic User Interface
HAIS	-	Hughes Automated Information Systems
HTML	-	Hyper Text Markup Language
HTTP	-	Hyper Text Transport Protocol
IADB	-	Interface Analysis Database
IDHS	-	Issue/Discrepancy Handling System
ICD	-	Interface Control Document
IDHS	-	Issue/Discrepancy Handling System
IIR	-	Integrated Information Repository
IRD	-	Interface Requirement Document
ISE	-	Integrated Support Environment
IV&V	-	Independent Verification and Validation
LAN	-	Local Area Network
M&O	-	Maintenance and Operations
N/A	-	Not Applicable
NASA	-	National Aeronautics And Space Administration
PAR	-	Performance Assurance Requirements
PDF	-	Portable Document Format
PS	-	Postscript
RAD	-	Rapid Application Development
RTF	-	Rich Text Format
RTM	-	Requirements Traceability Management
SMO	-	System Management Office

SOW	-	Statement Of Work
STD	-	Standard
TBD	-	To be determined
TBS	-	To be supplied
TMDB	-	Test Management Database
TXT	-	ASCII Text
V&V	-	Verification and Validation
WAN	-	Wide Area Network
WVU	-	West Virginia University
WWW	-	World Wide Web

6. GLOSSARY

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7. NOTES

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8. APPENDICES

8.1 Appendix A Open Client Installation Instructions

Installing Open Client (first time install)

1) Insert Disk 1 - netlib
2) Click on setup_10.exe (in file manager)
3) Click on OK (license agreement)
4) Click on OK (c:\sql10 is default)
5) Click on LAN Workplace TCP/IP then OK
6) host: fairmont.ivv.nasa.gov, port: 10412, then click on OK
7) Click on OK (SYBASE is default)
8) Click on Install (review information first)
9) Yes (modify autoexec.bat)
10) Click on OK (license agreement)
11) Click on OK (reboot)
12) Insert Disk 2 - cdevkit1 (C developers kit)
13) Click on setup_10.exe (in file manager)
14) Click on OK (license agreement)
15) Click on OK (c:\sql10 is default)
16) Yes (sql10 exists)
17) enter username of person using the PC on which install is being performed.
18) Yes (debuggable version)
19) Yes (on-line help)
20) Click on Install
21) Insert Disk 3 - cdevkit2 (C developers kit) (it asks for disk 2)
22) Click on OK
23) Yes (edit autoexec.bat)
24) Click on OK
25) Click on OK (reboot)
26) Edit the autoexec.bat file to include c:\sql10\bin and c:\sql10\dll in the PATH and make sure that the call of c:\sql10\bin\wsybsetup comes before invocation of windows, but after network startup.
27) REBOOT the machine.
28) Insert Disk 4 - dblib
29) Click on install.exe (in file manager)
30) hit <enter> key
31) enter Y, then <enter> (default is N)
32) hit <enter> key (default is Y)
33) enter 888701, then <enter>
34) enter A then <enter>
35) enter A, then <enter>
36) enter C, then <enter>

37) enter \sql10, then <enter>
38) enter N, then <enter>
39) hit <enter> key
40) hit <enter> key
41) Insert Disk 5 (SYBASE netlib)
42) Click on install.exe (in file manager)
43) hit <enter> key
44) enter Y, then <enter> (default is N)
45) hit <enter> key (default is Y)
46) Novell LAN Workplace TCP/IP, then<enter>
47) c:\widows, then <enter>
48) enter 892829, then <enter>
49) enter C, then <enter>
50) enter \sql10, then <enter>
51) enter fairmont.ivv.nasa.gov, then enter
52) enter 10412, then <enter>
53) enter N, then <enter>
54) enter A, then <enter>
55) enter Y, then <enter>
56) hit <enter>key
57) run c:\subclenv.bat
58) add openclient group (in windows from program manager; File, New)
59) Add wisql item in openclnt group (c:\sql10\bin\wisql.exe)
60) Add wsybping item in openclnt group (c:\sql10\bin\wsybping,.exe)
61) Test by connecting to SYBASE through WISQL. For this you will need to have an account and a sample/test query to run. Contact the folks in Fairmont for this.

* If any of the above steps do not occur as shown then consult the manuals first, fairmont folks second, and Open Client vendor third..

8.2 Appendix B SQLNet Installation Instructions

Installation of SQLNet to provide access to Oracle

1. Insert Oracle Products for Windows Version 7.0 CD into drive
2. run `d:\install\orainst.exe`
3. customer name -> `Intermetrics`
4. accept default directory for installation `c:\orawin`
5. choose Oracle Network Manager 2.1.3.0 a in left window and press install button
6. choose Oracle TCP/IP Adapter 2.0.5.0.4 and press install button
7. close Oracle Install
8. Add a program item to the Oracle program group `c:\orawin\bin\nettest.exe`
9. Double click on the Oracle Network Manager icon in the Oracle program group
10. From the NETMAN object list highlight Community and press the create button
    11. name -> `tnslsnr`
    12. protocol -> `tcp` press OK
13. From the NETMAN object list highlight Node and press the create button
    14. node -> `fairmont`
    15. type -> `unix`
    16. community -> press link button choose `tnslsnr` press OK
17. From the NETMAN object list highlight listener and press the create button
    18. name -> keep default `LISTENER`
    19. node -> keep default `fairmont.world`
    20. under databases press create button
        21. name -> `tnslsnr`
        22. SID -> `rtm`
        23. Oracle Home -> `/usr/local/rtm/oracle7141.sunos5` press OK
    24. under addresses press create button
        25. host -> `fairmont.ivv.nasa.gov`
        26. port -> `1580` press OK button
        27. press OK button
28. From main menu in Oracle Network Manager choose `File Save`
29. when filter dialog box appears click OK
30. `c:\orawin\network\`
31. From main menu in Oracle Network Manager choose `File Validate`
32. From main menu in Oracle Network Manager choose `File Generate`
    33. Export Network Definition dialog box choose OK
    34. `c:\orawin\network\admin\` press OK button
35. Close Oracle Network Manager
36. Using File manager copy all files in `c:\orawin\network\admin\rtm\fairmont` to `c:\orawin\network\admin`

`To test installation using nettest icon in Oracle program group`

User ID: `ecs091895`
Password: `ecs091895`
connect string: `tnslsnr`

8.3 Appendix C Deployment Files

ARDB Report Format Files:

MSCORE.QRP
MSCORE2.QRP
NTRACE.QRP
ORPHAN.QRP
SCORE.QRP
SCORES.QRP
SUM2.QRP
SUMGRAPH.QRP
TRACE.QRP

SQL Windows Deployment Files:

AUTOSQL.DLL
EOS.BMP
ERROR.SQL
GCMAIL.DLL
GCTRL30.DLL
GEE30.DLL
GRE30.DLL
GSW16.EXE
GSWAG16.DLL
GSWDLL16.DLL
GTIOBJ30.DLL
GTOOLS30.DLL
HPORT50L.DLL
IMAGEMAN.DLL
MAILDLG.DLL
OMS.DLL
OPENCLIE.GRP
QCKMAIL.DLL
QCKTBL.DLL
QCKUTIL.DLL
QGRAPH.DLL
RDW30.DLL
SHRTSK30.EXE
SMI.DLL
SQL.INI
SQLAPIW.DLL
SQLNUM30.DLL
SQLODBW.DLL
SQLORAW.DLL

SQLRUN50.EXE
SQLSQSW.DLL
SQLSST30.DLL
SQLWSV.DLL
SRVCAP30.DLL
SWIN41.DLL
SWIN50.DLL
SWLIST.DLL
VIM.DLL
VT50.DLL